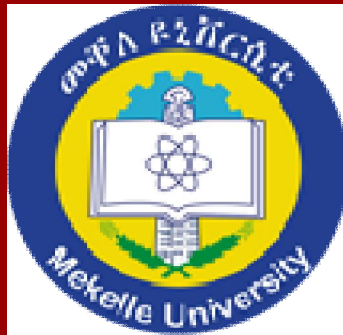


MEKELLE UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF ECONOMICS



**CADASTRAL SYSTEM OF RURAL LANDHOLDING AND CERTIFICATION: INITIAL
IMPACTS ON LAND CONFLICTS AND GENDER IN TIGRAI, NORTHERN ETHIOPIA**

By:
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**A Thesis Submitted in Partial Fulfillment of the Requirements
For The Master of Science Degree
In
Economics
(Development Policy Analysis Specialization)**

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Co-advisor: Desalegn Beyene (MSc)

**May 2013
Mekelle, Ethiopia**

DECLARATION

I, **Tsegabirhan Gebremedhin**, do hereby declare that the thesis entitled “*Cadastral System of Rural Landholding and Certification: Initial Impacts on Land Conflicts and Gender in Tigray, Northern Ethiopia*”, submitted to the department of economics, Mekelle university in partial fulfillment of the requirement of masters of science in economics (development policy analysis) , is my original work and it has not be presented for the award of any other degree, diploma fellowship or other similar titles, of any other university or institution.

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Place: Mekelle, Tigray, Ethiopia

CERTIFICATION

This is to certify that this thesis entitled “*Cadastral System of Rural Landholding and Certification: Initial Impacts on Land Conflicts and Gender in Tigray, Northern Ethiopia*”, is an authentic work of **Mr. Tsegabirhan Gebremedhin Kahsay** who carried out the research under my guidance. Certified further, to the best of my knowledge the work reported here in does not form part of any project report or thesis on the basis of which a degree or award was conferred on an earlier occasion on this or any candidate.

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Abstract

Background: Land has been the center of socio-economic and political debate since time immemorial. One of the main reasons for the increasing incidence of land-related conflicts; failure of land tenure systems to respond to the increasing land pressures and that this undermines investment incentives and land productivity. Women's empowerment as a development goal is based on a dual justification: empowering women is by itself social justice and it is a means to other ends.

Methods: The paper is based on the information from 279 households, 116 treated and 163 comparisons of Raya-Azebo woreda, Northern Ethiopia. After creating the common support through matching, logit and ordered logit models are employed to see the parametric relationships. OLS is also used in estimating the decision index of women empowerment.

Results: The intervention seems to bring marked results in terms of reduction in the level of border conflict, perceived risk of encroachment and concern of border disputes. Farm size failed to significantly affect the change in border disputes. Nevertheless, other plot characteristics like clear demarcation, soil type, slope of the land, plot distance from the residence of the households; and household characteristics are found to significantly affect the variation in the probability of border disputes. In all the treated and non treated, gender of household head explains the variation in conflict in such a manner that those households with male headed have lower probability of border disputes as compared to the female headed households.

There is no strong evidence (at least statistically) if participation in to the program has brought a change in the perception of women on equality with men counterparts. The same is true for the variable decision making on income earned of the household. Though the sign of change is encouraging, we cannot argue that participation in to the program has brought about an increase in the fall-back option or threat point and hence bargaining power of women in the study area, at its initial phase of implementation.

Conclusions: The overall objectives of the intervention are, among others, reduction in border conflicts, and empowering women through joint titling. In its initial phase, the program is succeeding in border conflicts, though cannot avoid it totally. Border conflict is still the problem both in the treated area and comparison area, though there is improving trend as hypothesized. With regard to gender empowerment, our focus of analysis was on decision making, contribution to family income and self esteem of women. With the results we find, we failed to conclude that the intervention has brought significant difference, though the sign of change is improving.

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List of Acronyms

CIA	Conditional Independence Assumption
CPRs	Common Property Resources
ELAP	Ethiopian Land Administration Program
ELTAP	Ethiopia: Land Tenure Administration Program
EMA	Ethiopian Mapping Agency
EPLAUA	Environmental Protection, Land Administration and Use Authority
ETB	Ethiopian Birr
FAO	Food and Agricultural Organization
FDRE	Federal Democratic Republic of Ethiopia
FIG	International Federation of Surveyors
GPS	Global Positioning System
HRSI	High Resolution Satellite Imagery
i.e.	That Means/is
IFPRI	International Food Policy Research Institute
INSA	Information Network Security Agency
MDGs	Millennium Development Goals
NASA	The National Aeronautics and Space Administration
OLS	Ordinary Least Square
PBSLLHRC	Parcel Based Second Level Landholding Registration and Certification
SLMP	Sustainable Land Management Program
SNNP	Southern Nations and Nationalities and Peoples
TEPLAUA	Tigray Environmental Protection, Land Administration and Use Authority
USAID	United States Agency for International Development

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Chapter One

Introduction

1.1 Background

Many interventions in rural development have not been able to effectively address their intended development objectives. Parts of the missing elements in these interventions are; effective administration of key resources like land, and not giving due attention or lack of appropriate strategy to make every target group or beneficiary, including women, of a given policy.

The recognition that land, and its associated resources, is the source of all wealth lies at the heart of good government and effective public administration. No country can sustain stability within its boundaries, or economic development within the wider world, unless it has a land rights policy that promotes internal confidence between its people, its commercial enterprises, and its government (Marquardt 2006).

Land titling programs that incorporate gender equality of ownership as a prior objective provide a unique opportunity to empirically evaluate this relationship.

Concerning the role of access to resources such as land and credit, Agarwal (1994), in particular, has argued that ownership of assets would be a very effective avenue in developing countries. In economies that are largely agrarian, land is the most productive asset and access to it enhances women's autonomy for many reasons. In a similar way, others have demonstrated a link between pre-marital assets and women's decision-making power. Also, there is some evidence that access to credit programs has a positive effect on female empowerment (Hashemi, Schuler, and Riley 1996). When land pressures become particularly severe, disadvantaged categories of land rights holders may be discriminated against and such groups typically include women (Holden and et al 2009).

The global food crisis that started in the year 2007 and the recent financial and debt crises have created a new emphasis on land, particularly in terms of food production. According to FAO (2010), the 2006-2008 food price crises evidenced the social and economic costs of women's

low access to land, which translated into disproportionately greater welfare losses of female-headed households. Basically starting from the Women's Conference in 1995, empowering women in the developing world has become a primary policy agenda. Traditionally, the male landholder as the household head is assumed to be the primary decision-maker in matters regarding land use and land transfers. Women's decisions and actions, and their relations with men, are considered secondary or unimportant to such decisions (Yngstrom 2002). This is aggravated when the opportunity structure through equal access to resources, among others, is not favoring to women.

A growing body of research indicates that societies with greater gender equality experience faster economic growth, and benefit from greater agricultural productivity and improved food security (USAID 2012). Women's empowerment as a development goal is based on a dual argument: that social justice is an important aspect of human welfare and is intrinsically worth pursuing; and that women's empowerment is a means to other ends (Malhotra 2002).

The World Bank (2002) defines empowerment as "the expansion of assets and capabilities of poor people to participate in, negotiate with, influence, control, and hold accountable institutions that affect their lives". The importance of gender equality is highlighted in its prominence in the United Nations Millennium Development Goals (MDGs), which have been commonly accepted as a framework for measuring development progress. Of the eight goals, four are directly related to gender which are: achieving universal primary education, promoting gender equality and the empowerment of women, reducing infant and child mortality, and improving maternal health.

In Ethiopia the 1995 FDRE Constitution gives importance to improve socio-economic situation of women and there are provisions on equal rights of women to property ownership, particularly land (FDRE, 1995:40). Following this, the government has enacted different interventions in which gender mainstreaming has got due attention at least in the directions and policies.

Among the main reasons underlying the increased incidence of land conflict in many countries is the failure of the prevailing land tenure systems to respond to the challenges posed by appreciation of land in a way that would enhance effective tenure security and thus provide the

basis for higher levels of investment and productivity-enhancing land transfers rather than the fragmentation of resources in conflict over land (Deninger and Castagnini 2004). Traditional interventions such as titling, which were very effective in other parts of the world, have proven inadequate in many other country contexts where, instead of fostering growth, they may even have led to higher levels of conflict. These raise the question whether government interventions like land registration and certification with a parcel based cadastral system can minimize the land related conflicts.

Platteau and Baland (2001) also find evidence of increasing incidence of within family land conflicts when population pressures become very severe in areas with the common practice of equal sharing of land among children, and in the sharing between parents at old age and their children on very small holdings that are insufficient to meet the needs of all. Deininger and Castagnini (2006) propose that one of the main reasons for the increasing incidence of land-related conflicts in Africa is the failure of land tenure systems to respond to the increasing land pressures and that this undermines investment incentives and land productivity.

In the study of the first level low-cost land registration and certification in Ethiopia, Holden et al (2009) found that land registration and certification appeared less able to initially reduce conflicts where land pressure was high, like near woreda centers, where such conflicts also were found to be more common. Many researchers, like Holden et al (2009) argue that there are few good empirical studies of how the security of tenure and the distribution of property rights using modern approaches of rural cadastre system affect land disputes.

Having these in to consideration, this paper aims to examine the impacts of the recently introduced rural cadastral system of land holding certificates in Ethiopia. The newly introduced land cadastre and certification program is different from that of the low cost landholding registration and certification that Ethiopia has exercised before. For one thing, the recently introduced rural cadastre system demands huge resources to implement due to its high-tech nature of the program. That is the program requires technologies like high resolution satellite imagery (HRSI), Global Positioning System (GPS), and other related systems in which it is done in collaboration with Ethiopian Land Administration Program, Ethiopian Mapping Agency,

Information Network Security Agency (INSA) and NASA. Secondly the previous landholding certificate and registration was based on traditional and customary practices of land demarcation which is believed to be source of land border conflicts. Third, the joint title of land for the husband and wife is secured in the modern cadastre system by indicating the name of both husband and wife. Fourth, the previous was based on all parcels at one document with limited information about the land, but the modern one is parcel-based i.e. each parcel will have a separate map with all the necessary information about the land.

With this virtue, investigating the impacts of modern certification on land disputes, and gender is a more relevant issue in the contemporary Ethiopia. It is with this background that this study is initiated to fill the existing literature gap on this issue by examining Ethiopia's experience and possible lessons for others on the impact of the program on land disputes and gender.

1.2 Statement of the Problem

The importance of one aspect of autonomy —economic autonomy— was highlighted in the Beijing Platform, in 1995 Women's Conference, which indicated that the best way to reduce poverty was to give women the opportunity to earn their own income by affording them equal access to resources, employment, markets and trade.

Daley (2011) in his study argued that with regard to land rights, gender is still not discussed sufficiently, as is visible for instance, in the recent literature on large-sale land acquisitions or “land grabbing”, in which gender is routinely ignored, although women, who are in general more vulnerable than men, are likely to be disproportionately affected by negative impacts on local populations.

Although the importance of formalizing property rights has been emphasized by number of scholars (de Soto 2000), surprisingly little seems to have happened on the ground. Progress via implementation of new programs has often been slowed by institutional obstacles. This may even have led many scholars to view interventions to register land as classic examples of a long discredited top-down approach to development rather than ways to empower land users (Easterly

2008). The improvements towards gender equality and empowerment can be greatly justified if women attain economic independence, decision making and granting land right is believed to help them attain such economic freedom.

Conflicts over land occurring within a nation state don't merely affect individuals or groups of people, but can be an important threat to a country's stability, especially in developing countries and countries in post-conflict transition.

Record keeping on land in the rural areas in the Ethiopia is scant and has been mainly through oral tradition. Thus, the absence of cadastral maps showing boundaries of land parcels to some scientific accuracy is expected to be the single most important contributing factor to the numerous land disputes leading to serious conflicts on land issues in the country and particularly in the rural communities where there is predominance of settler farmers.

According to Hundie (2006); Michael et al. (2005); and Rahmato (2005) Weak government and customary institutions, population growth, frequent drought, resource degradation, and encroachment or expropriation of rangelands are some of the causes of inter-pastoral conflicts and between pastoralists, the government, and farmers. Lack of adequate demarcation, registration and record keeping has led to overlapping land claims stemming from inheritance that is beginning to result in conflict. There is evidence that violence and intimidation are used against women who attempt to use the law to establish and defend their right to landholdings (Holden 2008).

A recent study by Deininger and Castagnini (2005) suggests a 5 to 11 percent productivity loss due to land conflicts. In developing countries the property rights of the poor must be adequately defined and protected so that they are able to leverage the capital they have to take advantage of economic opportunities outside the locus of family and community. The land question is such a critical issue because development is all about the basic means of production—land, labor and capital—and the ways we change and use them.

Lack of clarity over property rights is one important source of conflict (Ho 2010). Sustainable growth and development in Africa – as well as the continent’s contribution to, and participation in, the world economy in the 21st century – will continue to rely largely on the manner in which land and land-related natural resources are secured, used and managed, and how property-rights systems function. Land is crucial to Africa’s social and economic development, as the majority of the population depend on land and land-based resources for their livelihoods.

It is important to highlight that conducting impact evaluation into such programs at the early stage helps to draw important lessons for scaling up as well as implement similar programs in other contexts.

In general, it is of paramount importance to study whether the parcel-based second level land holding certificates has an impact on land conflicts and gender empowerment or not. As it is recently introduced program, there is no research undertaken in this area, as to the best knowledge of the researcher. It is with this back ground that this study is initiated to fill the existing literature gap on this critical issue by examining the impacts of parcel-based second level land certification on land border disputes and gender empowerment in Tigray regional state, Ethiopia.

1.3 Objective of the Study

This study tries to examine the ability of the parcel-based second level land holding certificate programs to achieve their desired effects. In general, it investigates the impacts of the modern rural cadastral system landholding certification on land border disputes, and gender empowerment.

Specific objectives

Specifically the study tries to investigate:

- *the link between modern land certification and land border disputes and its implication*
- *The impact of modern cadastral rural land holding certificates on women empowerment,*
- *And to consider policy conclusions and implications for further policy development investigation in the area*

1.4 Hypotheses of the Study

H₁: Unclear land border demarcation is positively correlated with frequency of conflicts.

H₂: The higher the opportunity cost of time (less fertile plot among others) the less conflicts.

H₃: Land surveying and registration programs that lead to better demarcation of land borders and land reforms contribute to reduce land border conflicts.

H₄: Land related conflicts are high in areas where population pressure is high. Per capita farm size in the study areas under consideration is used as an indicator in this respect.

H₅: Modern land certificate with joint titling of husband and wife empowers women in terms of the self esteem they build in.

H₆: Joint land certification increases women's household decision making.

H₇: The intervention fosters women's participation in the decision of household income.

1.5 Research Questions

Basically the study addresses questions of:

- *What would the impact of this program on border conflicts as a result of poor and traditional border demarcations that has noticed before?*
- *Is the recently introduced rural land cadastral system bringing about significant change in border land disputes in rural Tigray?*
- *Does the second level modern land holding certificates promote gender empowerment?*

1.6 SIGNIFICANCE OF THE STUDY

It is recognized that land plays the key and central role in any economy, particularly in economies depending on land like that of the agrarian nations. However, its administration and management may determine its contribution to the economy.

Cadastral surveying and registration is among the interventions that are pursued to land management and administration which is recently introduced in Ethiopia. Impact evaluations, in general, are useful to provide relevant information to the decision makers of the evaluated or similar future interventions. In addition to the evaluative purposes, this study is expected to be relevant for knowledge generation, in particular for the priorities of the research community.

Another important role that this study might have is investigating the pilot level intervention so that it helps to draw lessons for scaling up this program. Before commencing our scarce resources we need to evaluate interventions at their early stage in order to alert policy makers and practitioners and tune the program based on its development objectives.

1.7 SCOPE OF THE STUDY

This study is confined to a pilot level intervention in Raya Azebo woreda in Tigray, northern Ethiopia. It evaluates the rural cadastral surveying and registration program on land related disputes, and gender. The study sticks to the impacts that are specific to the intervention under consideration focusing those indicators that are expected to change within the stipulated period and the intervention.

The unit of analysis in this study are households and plot level characteristics. In this regard, impacts of the program at national and community level are beyond the scope of the study. As it is a pilot level impact evaluation, the analysis is based on cross sectional data.

Chapter Two

Review of Literature

In this part, we briefly reviewed and outlined previous studies giving more emphasis to the most recent ones. Furthermore, we have tried to stick in to the subject matter of land and its impact on conflict and women empowerment.

2.1 Terminologies

Land administration: UN (1996) has stated that land administration is the process of recording and disseminating information about the ownership, value and use of land and its associated resources. Such processes include the determination (sometimes known as the “adjudication”) of rights and other attributes of the land, the survey and description of these, their detailed documentation and the provision of relevant information in support of land markets.

Land registration: is a process for recording, and in some countries guaranteeing, information about the ownership of land. A right is something to which some person or group of persons is entitled. The function of land registration is to provide a safe and certain foundation for the acquisition, enjoyment and disposal of rights in land.

Cadastral: The International Federation of Surveyors (FIG 1995) defines a cadastre as a parcel based and up-to-date land information system containing a record of interests in land (e.g. rights, restrictions and responsibilities). It usually includes a geometric description of land parcels linked to other records describing the nature of the interests, ownership or control of those interests, and often the value of the parcel and its improvements. It may be established for fiscal purposes (valuation and taxation), legal purposes (conveyance), to assist in the management of land and land-use planning (planning and administration), and enables sustainable development and environmental improvement.

Gender: WHO considers gender to the socially constructed roles, behaviors, activities, and attributes that a given society considers appropriate for men and women. Sex refers to the biological and physiological characteristics that define men and women.

Female empowerment and equity: A comprehensive definition of empowerment is suggested by Kabeer (1999) whose thinking is closely related to Sen's capability approach (Sen 1990). According to Sen, poor people lack the capability to choose the way of life that they want to live. In this context, empowerment means to extend the set of choices that the poor can make, that is, empowerment implies an increase of agency. Agency is not necessarily limited to taking action but also includes effective resistance to actions or decisions, or even their manipulation (Safilios-Rothschild 1982; Sen 1990).

Bargaining power: Bargaining power is also termed threat point or fallback position, which denote the level of utility a household member could achieve if the household were to separate. Lundberg and Pollak (1993) define bargaining power slightly different by stating that household members may not necessarily quit the household, but stop or reduce collaborating in the daily life.

2.2 Determinants of Bargaining Power and Empowerment

Measures used for gender empowerment in the empirical literature largely rely on a woman's fallback position that defines her range of options once the common life or marriage dissolves. Education, as in Agarwal (1997), is used indicator in because it increases access to information; the likelihood to find a job in the wage labour market; the likelihood of technology adoption and use etc. Another measure used is income earned because wage income is likely to be available to a woman even after a divorce. Additionally, assets controlled by women are used to approximate their bargaining power. Here, assets such as land or livestock are particularly important because these may be used as a 'credible threat', i.e. women would keep these assets after leaving the household.

Literature on women in agricultural societies generally reports wide ranging gender inequalities which limit women's opportunities to generate income, to express their will, to make choices, etc. (Blackden and Bhanu 1999).

There can be a difference between what a person actually contributes, needs, or is able to do, and perceptions about her/his contributions, needs or abilities. To state it in other words, a person's contributions may be undervalued because of her gender. The work women do might be labeled "unskilled" and that which men do as "skilled" simply because of their gender, even if the tasks

are done by both gender require equal amounts of skill. Perceptions about contributions can also depend on how “visible” the work is: home-based or unwaged work is often seen as less valued than work that is physically or monetarily more visible. Indeed, women’s contributions to the household are typically undervalued not just by family members, but often also by policy-makers and bureaucrats implementing development programs. According to Agarwal (1997) such perceptions affect intra-household allocations and bargaining power.

2.3 Land and Land Related Disputes

Despite the increasing incidences of land conflicts, previous studies on this topic have been limited to some specific incidences that are related to large-scale civil strife or politically motivated conflicts. A recent study in Uganda by Deininger and Castagnini, (2005), however, shows that rural households experience small-scale land conflicts with relatives, neighbors, landlords, or local governments, and that such small-scale conflicts may have significant impacts on their agricultural productivity.

When Thomas Malthus wrote *An Essay on the Principle of Population* in 1798, he predicted that population would outrun the supply of food and unless moral constraints and vice be put in place, like in the form of, diseases, starvation to death or war would be the unavoidable result. This line of thought goes back to Thomas Malthus and neo-malthusians that see population growth and land degradation as potential sources of violent conflicts. The struggle for survival may involve fighting over scarce resources (Homer-Dixon 1999) and extreme environmental scarcities may eventually lead to collapse (Diamond 2005).

Another view states that land scarcity leads to intensification, technical and institutional innovation, including ways to resolve conflicts in a better way. The latter view is close to the views of Boserup (1965). There is also a literature emphasizing that inequality may lead to conflicts, like the theory of relative deprivation (Gurr 1970), arguing that absolute poverty may lead to hopelessness and inactivity, while comparisons with those in the same society who do better may lead to actions and conflicts.

Deininger and Castagnini (2006) propose that one of the main reasons for the increasing incidence of land-related conflicts in Africa is the failure of land tenure systems to respond to the

increasing land pressures and that this undermines investment incentives and land productivity. According to Zwan (2011), there are many factors to land-related disputes. One is increased competition and demand for land. In many African countries, violent conflicts are directly related to the competition for access to and use of land and natural resources. Competing claims to land and natural resources and inequitable access to land and inadequate access for the poor has been, and is, a source of conflict in a number of African societies, and the situation is often aggravated during times of food scarcity or when extractive resources are discovered. Similarly, the rapid growth of populations and the increase in agricultural and non-agricultural demand for land aggravate the potential for disputes over land, which are unproductive and, within weak or inequitable institutional set-ups, risk favoring biased solutions.

Deininger et al (2008) confirm that efforts since 2004 to convey more secure tenure rights through low-cost certification of plots have been well received by rural Ethiopians as well as many external donors who believe that such measures will underpin greater rural investment and poverty reduction.

However, these certification schemes do not address common property holdings (pastures, forests, watersheds) that contribute to degradation of land, nor do they facilitate rental of land or permit mortgaging. Further, while they are judged to have reached the poor, they have not always been supportive of women's rights to land. Efforts to enable land-poor Ethiopians in some highland areas to relocate to less densely settled lowland areas have been perceived as less successful in sustainably expanding access to land (Kassa 2009).

Inequitable land access and land distribution might also be among the factors to land-related disputes. It is evident that inequitable land distribution, tensions between traditional and modern land-ownership systems, and poor land administration can lead to, and be a cause of, severe injustices and violent conflict.

2.4 Cadastral Surveying and Land Administration

Steudler (2010) argue that though there is a strong relationship between cadastre and land registration functions, they differ in content. While the land register holds the records on right on land through deeds or titles, the cadastre contains information about land properties and their

boundaries within a certain administrative area. Land registration and cadastre functions complement each other and should ideally be handled within the same system.

As the World Bank has pointed out, a highly skewed distribution of landownership and patterns of land access can worsen and further aggravate social conflict and violence. The likelihood of violent conflict increases considerably when gross inequities characterize land-holding patterns, particularly when a large landless or land-poor population group has limited livelihood opportunities. This calls for a standardized and modern approach of property right registration and certification.

But according to Richards and Pierre (2007), the principal failings of the standard approach of registration and property titling: for one thing this approach favors the registration of owners, sometimes turning holders of all the administration rights in a given area into “customary owners”, individuals playing simply a role of arbitration or of moral or religious authority, or enjoying considerable social and political capital. Secondly, the intra-family and inter-generational dimension of the management of land rights is often ignored. Third, user rights other than agricultural rights are ignored. Fourth, by strengthening customary rights in accordance with traditions, the customary principles may be contradictory. Above all, Surveying and titling operations are based on the assumption of a contradictory procedure guaranteeing a participative approach. In fact, exclusion is commonplace and presence does not guarantee the expression of existing disputes. The composition and workings of land commissions reactivate the state of local power balances and the degree of legitimacy of land authorities.

Sustainable growth and development in Africa as well as the continent’s contribution to the world economy in the 21st Century will continue to depend largely on the manner in which land and land-related resources are secured, used and managed. This will require that these issues be addressed through comprehensive people-driven land policies and reforms which confer full political, social, economic and environmental benefits to the majority of the people.

Deininger (2009) deals the factors that have led to the recent increase in interest in land registration and formalization of property rights to land in Africa. First, since the 1990s, most African countries have passed new land legislation to remedy some of the perceived

shortcomings of existing systems, particularly by strengthening customary land rights, recognizing occupancy short of full title, improving female land ownership, and decentralizing land administration. Advances in information technology and remote sensing have revolutionized the way land is administered in other regions and reduced the cost by providing tools for implementation that were not available before. Second, higher prices for food, fuel, and fiber are capitalized in land values and, together with emerging demand for land by investors, add to pre-existing pressures on land from urban expansion all over Africa. Clearly defined property rights (at the individual or group level) and a well-governed system of land administration are essential to avoid socially undesirable outcomes and conflicts.

This theme calls to surveying and mapping of land parcel boundaries in support of land registration, land administration and land management. Different types of surveying techniques can be used for cadastral purposes: traditional field survey techniques (ropes and steel tapes), total stations, GPS and remote-sensing techniques. The type of cadastral survey technique to be used requires technical knowledge and capacity, which should strike a balance between accuracy, cost, value of the property and resources available (Solomon 2010).

2.5 Land Registration in Ethiopia

Based on the Federal Proclamation (Proc.89/1997), four regional states (Amhara, Oromia, Tigray and SNNP) have issued region-specific land administration and use proclamations and commenced with land registration system (Abate 2010). The Environmental Protection, Land Administration and Use Authority (Amhara and Tigray) and Natural Resource Sector within the Bureau of Agriculture (Oromia and SNNP) were delegated to administer and register land. The land registration system that has been undertaken in the four regions is title registration, which involves recording the right itself (title) with the name of rightful owner and object of that right. Deed registration, which records legal documents, is not for registering title to land and does not prove who owns the land. The basic characteristics of the registration system in the four regions were more or less similar, wherein traditional registration is the main feature and the recording is manual except in Amhara pilot project where manual system of records are in the process of being booked by electronic copies at the Wereda level.

In none of the regions a (cadastral) map has been prepared, not even a sketch in the low-cost land registration and certification. Plots are, however, demarcated in the terrain, although not always with very durable materials. With traditional methods the size of the plot is determined (either using ropes or relying on knowledge of the number of ‘timads’ of a plot). In addition the plot is described by naming the neighbors on the North, East, South and West.

Boundaries of (sub) kebele and communal lands were not demarcated and measured, since it was believed that this information (and markers in the terrain) was still relatively well known. The process was limited to the individual farming land. The landholder and his neighbors are supposed to be present on the plot when it is being identified and measured (or estimated). If one is not there, the plot will not be registered (some households did not participate due to fear or lack of information about the advantages). Measurement was done with ropes (locally made from leather) mainly by students.

2.6 Land Registration and Certification in Tigray

The Tigray region commenced the land registration and certification process in 1998–99 and was the first region to do so. It utilized simple traditional methods in implementation, including students with short-duration training, and strong local participation.

After realizing the previous land registration problems, the government of Tigray took an initiative to register and distribute land certificates to all owners of only cultivated land with the underlying objectives of minimizing disputes and conflicts, increasing the tenure security, upgrading the register and title.

It came after 15 -18 years of the “Belbal” way of land recording. Land registration and certification was stopped when the new Tigray State Proclamation 77/2004 gave the responsibility for land administration and registration to the Environmental Protection, Land Administration and Use Authority (EPLAUA) in 2004. The new Authority uses the same forms that were designed by the Bureau of Agriculture and Natural Resources during the land registration and certification process.

During the process of transferring use-rights to new land users due to transactions and successions, the information recorded in the designed form about the plot of rural cultivated land should reflect the existing situation of the land to be transferred, such as boundary marks, relative status of land quality, size of the land, etc., by comparing with the previous land records. But Abate (2000) argue that the Weredas were not applying the devised land records updating, rather they are using a different way of updating land records. This is not because of the difference of their system from the one used by EPLAUA (Environmental Protection, Land Administration and Use Standardization of Rural Land Registration and Cadastral Surveying Methodologies Authority) but due to lack of capacity to implement, law priority is given to land record updating and lack of follow up during the implementation. They register the land transactions in a way that does not reflect the registration system of the region. Moreover, during transaction they use only the registry book number as backward and forward reference to the original land data record.

2.7 Impact of Certification

In this section we will briefly see some of the impacts of the previous low-cost land certification that was implemented in Ethiopia. There may be many impacts but I will stick to the thematic areas of this study.

Holden et al (2009) confirmed that two factors have led to increased recent interest in land registration and formalization of property rights to land in Africa. First, most African countries have, since the 1990s, passed new land legislation to remedy some of the perceived shortcomings of existing systems, in particular to strengthen customary land rights, recognize occupancy short of full title, improve female land ownership, and decentralize land administration. Advances in information technology and remote sensing have revolutionized the way in which land is administered in other regions and reduced the cost of doing so, providing tools for implementation that were not available earlier. Second, increased prices for food, fuel, and fiber are capitalized in land values and, together with emerging demand for land by investors, add to pre-existing pressures on land via urban expansion all over Africa. Clearly defined property rights (at the individual or group level) and a well-governed system of land administration will be essential to avoid that these lead to socially undesirable outcomes and conflicts.

The previous low cost land registration and certification in Ethiopia, according to Holden et al (2010) found that the registration and certification has reduced the number of border disputes after completion of the registration and certification but that the number of border conflicts has been on the increase since then.

Therefore, focusing on the objective and scope of this study, land registration and certification have an impact on the following issues:

Reduction of conflict: Holden et al (2009) found that all the communities of the four regions under consideration, pointed towards a marked reduction in land-related conflicts due to clarification of boundaries and field-based adjudication that were undertaken in the context of the certification program. While some indicated that this reduction was universal across types of conflict, only specific types were affected in others, suggesting that the way in which certification is conducted will have an impact on the eventual outcome observed. In addition to that the first level land registration and certification was implemented following the land registration that was of poor record keeping system. However it is believed that even after the first level land registration there land conflict cannot be solved to a desired level so that the current second level land cadastre and registration program is launched.

Women's empowerment: as in the study of Deininger et al (2009), women in most of the communities visited indicated that inclusion of their name on the land use certificate (as practiced in all of the regions except in Tigray) helped to improve their status and bargaining power vis-à-vis their husbands and the community at large. However, women's participation in public meetings, their awareness of the law and the process of certification, and their representation in the land administration committee (which was uniformly lower than what is stipulated in the law) varied widely across communities.

2.8 Empirical Review

Deininger et al (2009) has found positive impacts of certification on gender relations in their study of the low cost land registration and certification that have been implemented in Ethiopia. They found that (i) there is little evidence of wealth bias in access to the program or the information surrounding it; (ii) female participation in the early stages of registration was limited

and there is considerable variation even among regions in the share of documents issued jointly or in the name of a female; and (iii) there is considerable interest in, and willingness to pay for, a map to complement the current verbal description of the land.

Holden and Tefera (2008) have also found, in their study of the first level land certification and registration in Southern Ethiopia, that the women's names on the land certificates increased the perception that the women would be able to keep the land after the divorce or death of their husband. However, they have found limited impact on women's ability to influence farm management. In its early phase, it has not brought significant impact on decision making of women on household matters and land related issues.

On the other hand, when registration involved identification of borders and systematic conflict resolution, it led to a significant drop in land conflict (Adal 2008). There is also evidence by the same author that a rather limited decrease in the share of kebeles who experienced problems at subsequent stages of the process, i.e. disputed registration forms, certificates that could not be awarded, and disputed certificates. With this virtue, Deninger et al (2009) suggested for further improvement in land certification following the low-cost land registration and certification.

Lack of updating could create problems particularly in commercial areas with higher transaction frequencies and jeopardize trust in the overall system. Second, although considerable effort is expended for first-time registration of individual holdings, in Ethiopia, failure to consistently include common property resources (CPRs) and house plots makes it difficult to use the data generated as a basis for an integrated land administration system. Demand for inclusion of house plots is already high and consistent mapping of CPRs, possibly in combination with land use planning and assignment of group rights could help confront serious resource degradation and soil erosion at rather low additional cost. Third, while registration demarcates boundaries in the field, it does not create a graphical record and may thus fall behind expectations in terms of reducing boundary disputes.

Similarly Holden et al (2008), in their study of the low cost first level certification in Tigray region of Ethiopia, have studied from respondents of local mediators. They have used outcome indicators on the level of conflicts before, during, and after the implementation of the program. They analyzed their discussion using logit and ordered logit models. Additionally they assessed

the perceived impact of the intervention on reduction of border conflicts from the data collected using the local mediators. They have found that the intervention failed to reduce conflicts, but significant change in the reduction of border conflicts after the implementation of the intervention.

The intervention under consideration in this study is newly introduced and has never been studied yet in the area. Therefore, we resorted in to the cross sectional data as there in no data collected before to serve as a baseline survey.

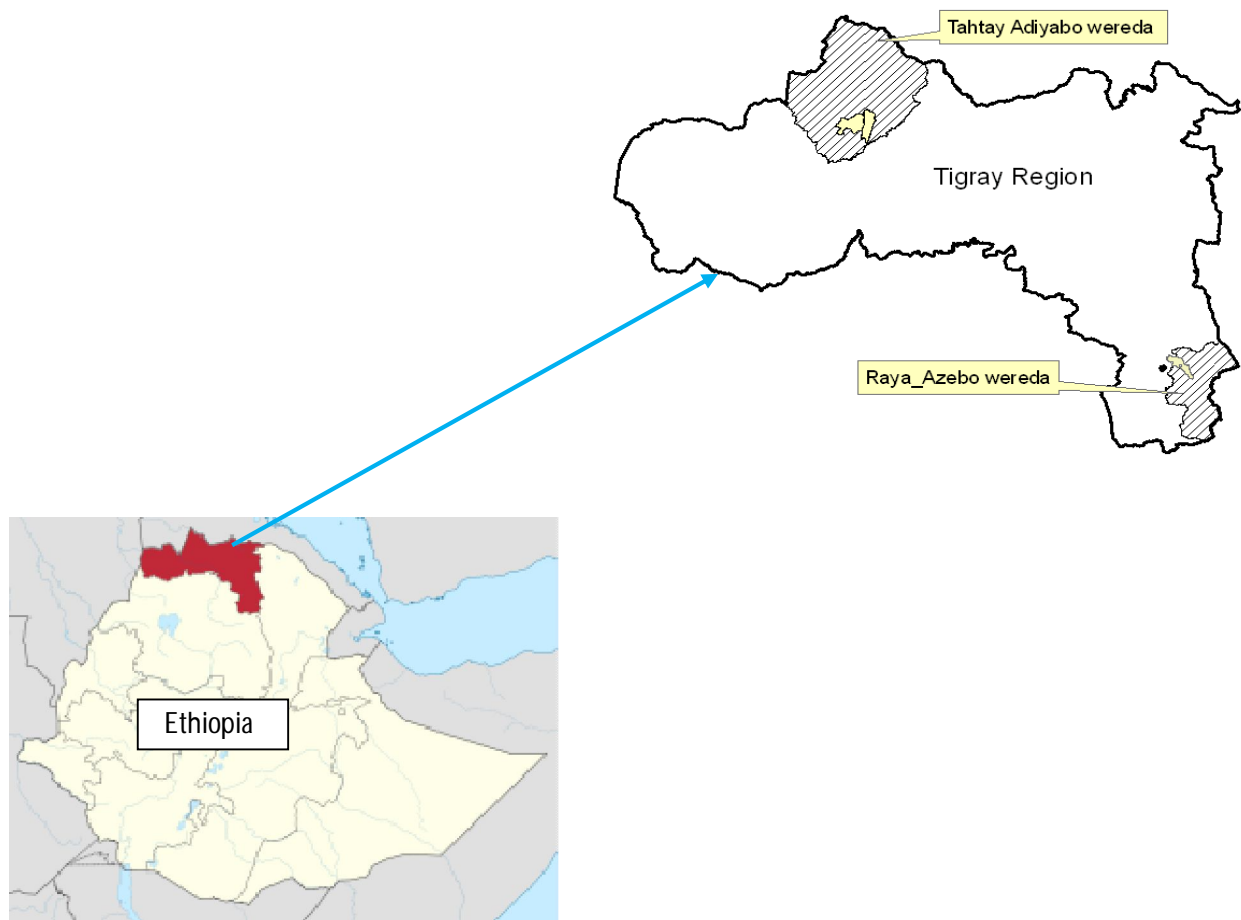
Chapter Three

Data, Conceptual Framework and Research Methodology

3.1 Site Selection and Description

The study is made in six tabias, namely Hawelti, Tsegea, Wargiba, Hadealga, Mechari and Kukufto in Raya-Azebo Woreda of Southern zone of Tigrai. This woreda is selected as the Parcel-Based Second Level Landholding and Certification in Tigrai Region is piloted in this area and more than 19,000 households are certified from this area which accounts a lion share as compared to other areas. The first three tabias are from the treated area and the remaining three are non treated area to serve as a comparison.

Figure 1: Locations of the Pilot Districts in Tigray Region, Ethiopia



Source: TEPLAUA, 2012

3.2 Data Sources and Sampling

Primary data is the main sources of information for successful accomplishment of the study. The primary data is collected from sample household survey using structured and semi-structured questionnaire. And secondary data is also collected from published and unpublished sources including progress reports of TEPLAUA.

A multistage sampling technique is used to determine the sampling households. First, Raya Azebo woreda is purposely selected. Raya Azebo woreda is the place where most households out of 24,000 households having the modern certificates; 19,098 are from this woreda. Second, 3 tabias from the participating and 3 tabias from the non-participating are randomly selected. Third, parcel-based second level land holding certificate participant and non participant households are identified from the households list available at each tabias. Finally, representative samples are selected from six tabias based on probability proportional to sample size. Following this procedure, 279 (116 from households that have parcel-based land holding certificates (treated) and 163 from those who haven't certificates (control)) sample households is selected from the respective tabias.

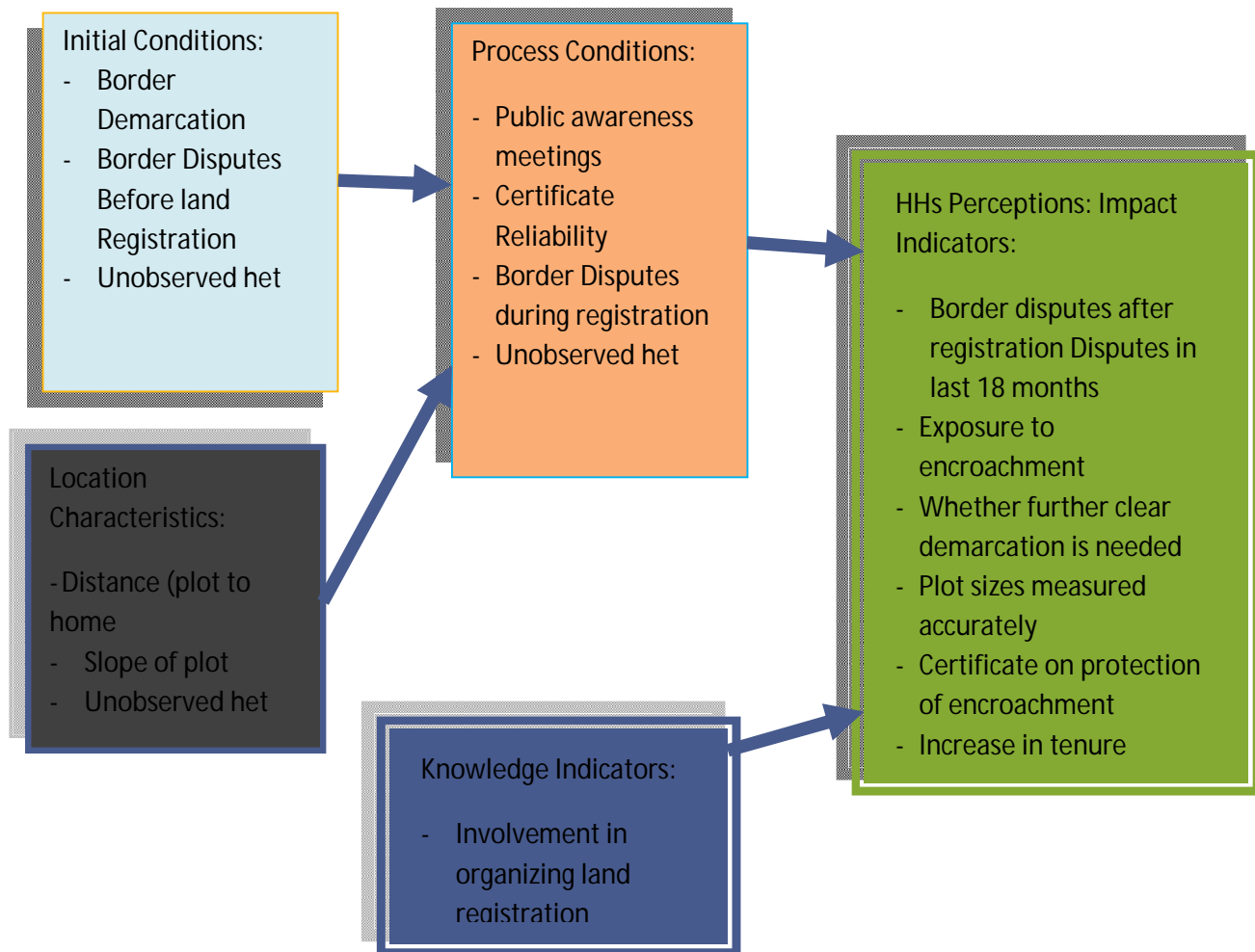
The data collection was carried out with the direct supervision of the researcher himself and a colleague studying in the area in which seven enumerators, undergraduate students of college of business and economics of Mekelle University were hired with adequate training.

3.3 The Conceptual Framework

Disputes and conflicts about land occur at all levels: Conflicts between neighbors about field boundaries; between men, women, and generations about their respective land rights; between pastoralists and farmers; between states and indigenous peoples. The figure below depicts briefly the framework to be followed while discussing the border disputes in this study.

3.3.1 Framework-Conflict

Figure 2: Conceptual Framework: HHs Perception on Conflict (Modified from Holden et al, 2009)



3.3.2 Framework- Gender

Economists throughout the years have tried to develop models of a household. These household models (as formulated by Becker (1981) among others) have a common belief that intra-household resource allocation involves income pooling and sharing among household members and that a household is a single decision making unit. This thinking has been widely challenged by many writers (Sen 1990; Nash 1953; Kandiyoti 1988). Their criticisms rest on the fact that such an approach ‘misses entirely intra-household relations of power, negotiations, subordination, and perhaps conflict and dissent’ (Wolf 1998) in descriptions of the household.

Each of these dynamics within the household is associated with a different set of gender relations (Young 1992; Wolf 1998); showing that households are not necessarily a site of equity but of bargaining (Whitehead and Kabeer 2001).

Taking in to consideration of the problem of ‘unitary’ conceptualization of the household, many economists, now come up with alternative models. Sen (1990) sees the household as a site of both cooperation and conflict where intra-household allocation is the outcome of bargaining. He asserts that bargaining power is influenced by the following: (i) fallback position, (ii) a possibly clearer perception of individuality and wellbeing, (iii) a higher perceived economic contribution.

According to his interpretation; he thinks individuals may contend, and in many cases fail to bargain because of perception of self worth and self interest (see also Bruce 1989). Fallback position is closely linked to the perceived contribution one makes to the households; the weaker the perception of contribution, the weaker the fall-back position. It also shows that an extra income can improve one’s fallback position by making the economic contribution visible and in the long run influences bargaining position. Young (2000) further asserts that decisions about which ‘allocative systems should be adopted, which spouse should have the final say on major financial decisions and the extent to which each spouse has control over expenditure depends on the entry point of money. The gender of the person owning wealth or earning an income seems to have a systematic effect on patterns of resource allocation and decision-making in the household (Kabeer 1995; Sen 1990; Kanji 1995).

Dito (2011) considered the expected level of assets upon divorce is also taken as an alternative indicator of bargaining power as a response to the Nash bargaining model. The Nash bargaining model argues that those women who have better fall back option outside the marriage have better bargaining power within the marriage (McElroy 1992). Often these fall-back positions are measured in terms of expected assets up on divorce.

On the other hand, the Nash bargaining framework by McElroy and Horney (1981) argues that household members, say husband and wife, solve a *joint* allocation problem to maximize the gains from marriage and that not only factors such as labour and non-labour income affect household allocation decisions but also ‘Extra Environmental Parameters’ (EPPs), because these

affect the individual threat points (utilities in the unmarried state) and therefore determine the respective bargaining (or decision) power of both partners.

Models, especially those that pursue the ‘bargaining game theoretic approach’, give insight in to analyzing intra-household power relations. Following the footsteps of Field (2000), it is considered a standard Nash cooperative bargaining model in which a married couple can both remain in the common life, or divorce and live singly. The idea here is that there is a convex utility possibility set R containing all utility distributions $(U1, U2)$ that could be achieved if they remain married. The utility of person i if he or she divorces is given by V_i . The assumption of potential gains to marriage implies that there are utility distributions $(U1, U2)$ in R that strictly dominates the utility distribution $(V1, V2)$. As in McElroy and Horney (1981) and Manser and Brown (1979), the outcome in marriage is assumed to be the symmetric Nash bargaining solution where the ‘threat point’ or the ‘disagreement point’ is divorce. Therefore, Nash (1953) bargaining provides the leading solution concept in cooperative bargaining models of marriage.

In Nash bargaining solution, the utilities received by husband and wife depend upon the threat point: the higher a spouse’s utility at the threat point, the higher the utility that spouse will receive in the Nash bargaining solution.

☑ Suppose two individuals: F (Female) and H (Male).

☑ Each person has resources

☑ If they try to use those resources separately, they can reach the welfare level

(W_f, W_h)

☑ Let the two individuals attain the welfare levels W_f' and W_h' after cooperation, their gains would be: $(W_f - W_f')$ and $(W_h - W_h')$

☑ Then the Nash bargaining solution (N) is to maximize the product of these two gains, i.e.

$$N = (W_f - W_f') * (W_h - W_h')$$

To put it down in words, it is expected an increased household food security, among others, when women hold control over land. In addition, social expenditure such as education, health and food expenditures positively linked to women’s income or resources. Further than that, children’s health and nutritional status more positively linked to mother’s control over resources/educational status than father’s (Smith et al 2003). On the other hand unequal access to

land constraints women's productivity as the women do have limited decision making power and depend on men for use rights which are easily lost if they are widowed or divorced (Fafchamps and Quisumbing (1998b)).

FAO (2002) further contends that there is a strong correlation between the decision making powers that a person enjoys and the land rights held by that person. FAO further argues that a majority of women's access to and control over land often reflects intra-household decisions which create gender asymmetries in bargaining power between household members.

The question of who makes the decisions within the household is used as an outcome variable because it seems to capture an aspect of women's bargaining power. It is with the assumption that women who have more bargaining power are more involved in decision making. Basically, the points of decision that this study will focus are: daily household need, large household purchase, Land rent out/share cropping whenever there is a need, adoptions of modern input, improved seed adoption, left fellow, and type of crop/seed selection.

In its recent Policy Research Report on land (Deininger 2003), the World Bank recognizes that past initiatives often failed to discern how control of assets, particularly land, is assigned within the household. The Policy Research Report argues that strengthening women's land rights is important both for potential gains to agricultural productivity as well as for household-level human capital investments, such as nutrition and child schooling. It advocates legal measures, education, and capacity building, as well as preferential treatment of women in public programs, such as those dedicated to land titling and land reform.

Rights to land and natural resources increase a woman's bargaining power within the household, which results in increased allocation of household resources to children and women as well as increased household welfare (Katz and Chamorro 2002; Quisumbing and Maluccio 2003). Quisumbing and Maluccio also find a positive relationship between the amount of assets (including land) that a woman possesses at the time of marriage and the shares of household expenditures devoted to food, education, health care, and children's clothing. Women's rights to land and natural resources can impact women's empowerment as well, not only household welfare. Panda and Agarwal (2005) have indicated that women with property ownership are less vulnerable to domestic violence in some parts of India.

3.4 Empirical Model and Estimation Methodology

3.4.1 Propensity Score Matching

Concerning the methodology utilized, this paper used both descriptive and econometric analysis. In descriptive analysis data from rural survey of the households is analyzed through tables, means, standard deviation percentages and frequencies are used in the analysis of the socio-economic characteristics of farmers' situation and plot level characteristics of the study area. In econometrics analysis, a model is specified and a corresponding regression is run. We used propensity score matching in order to create a common support, and then we go for parametric estimation using logit, ordered logit and OLS models to address the stated objectives.

When a treatment cannot be randomized, the next best thing to do is to try to mimic randomization—that is, try to have an observational analogue of a randomized experiment. With matching methods, one tries to develop a counterfactual or control group that is as similar to the treatment group as possible in terms of *observed* characteristics. The idea is to find, from a large group of nonparticipants, individuals who are *observationally similar* to participants in terms of characteristics not affected by the program. Each participant is matched with an observationally similar nonparticipant, and then the average difference in outcomes across the two groups is compared to get the program treatment effect through the parametric relationship. If one assumes that differences in participation are based solely on differences in observed characteristics, and if enough nonparticipants are available to match with participants, the corresponding treatment effect can be measured even if treatment is not random.

The key assumption made in PSM is that selection into a program can be captured with observable data that are available to the evaluator. This is known as the *Conditional Independence Assumption (CIA)*. $(Y_0, Y_1) \perp T \mid X$

Using their assertion that '*treatment assignment is strongly ignorable*', Rosenbaum and Rubin (1983) displayed that, for non-randomized observations, outcome and treatment are conditionally independent given the propensity score, $P(x)$, $(Y_0, Y_1) \perp T \mid P(x)$

A balancing condition needs to be satisfied for propensity score matching.

$$T \perp X \mid P(x)$$

A second assumption is the *common support* or *overlap condition*: $0 < P(T_i = 1|X_i) < 1$. This condition ensures that treatment observations have comparison observations “nearby” in the propensity score distribution (Heckman, LaLonde, and Smith 1999).

What model to be used for the estimation for the binary treatment case is not critical problem, because both logit and probit models often yield similar results. However, due to the complexity of estimation procedure of probit model than the logit model, logit is widely used (Caliendo and Kopeinig, 2005). To capture this advantage, the *logit model* is used for estimating the propensity score in this study. The logit model is mathematically formulated as follows:

$$P_i = \frac{e^{Z_i}}{1 + e^{Z_i}}$$

Where, P_i is the probability of participating in the parcel-based second level land holding certificate program, $Z_i = \beta_0 + \sum \beta_i X_i$

Where $i = 1, 2, 3, \dots, n$ β_0 = intercept and β_1 =regression coefficients to be estimated X_i =pre intervention characteristic

3.4.2 Logit Model Specification

After ensuring the common support via matching, the next step is to pin point the treatment effect through parametric relationship of logit model. The dependent variables for the land related disputes and conflict are treated in different indicators:

- Conflict is measured cross-sectionally by the prevalence of conflict before two years (before the introduction of the intervention under consideration) or perceived concern of incidence of conflict (y_i) in which it will take value 1 if land border conflict is a concern for the household under consideration and zero otherwise, given the exogenous explanatory variables (X_i) and whether the household has received the cadastral certificate or not. Hence the logit model will be specified as:

$$p(Y_i = 1 | X_i) = \beta_0 + \beta_1 X_i + \beta_2 C_i + e_i$$

- Using a similar strategy, threat of encroachment by neighboring farmers is regressed against the mentioned variables.

An ordered logit model is employed to see the following outcome variables:

- Level of border disputes since the last two years (1=less disputes, 2=no change, 3=more disputes),
- Change in border disputes in the last 18 months (1=improved, 2=no change, 3=worsened)

With regard to gender, following the same strategy, the indicators that have been regressed are:

- Perceived equity of women as compared to their husband in which it takes $Y_i=1$ if yes and zero otherwise for the question whether they perceive they are equal with their husbands this time as compared to before two years.

In addition to that, participation in household decision making is taken as an indicator on the issues of: Daily hh need, Large hh purchase, Land rent out/share cropping if needed, Adoptions of modern input/fertilizer, Improved seed adoption, Left fellow, type of crop/seed selection, and Access to and decisions on credit. These scenarios of decision making will be indexed using equal weight.

In this case the dependent variable is empowerment as a function of the decision making on the above mentioned issues. To have another way of seeing the situation, we have regressed OLS of the decision index as dependent variable.

Moreover, decision on household income is taken as another indicator of empowerment, taking 1=jointly husband and wife, 0=husband only. Then logit model is applied to see the relationship. As an indicator of self-esteem of women and hence empowerment of them, whether beating of one's wife is justified or not, taking some scenarios, is regressed with similar logit specification (1=yes/beating justified, 0=no/beating not justified).

To see the case in to another way, we have used an ordered logit model for the decision index and self esteem index, by having some cut points on the level of empowerment.

Chapter Four

Results and Discussion

In investigating whether the second level parcel based land certification and registration can reduce land related disputes and increase women empowerment, the cross-sectional data and the respective methodologies are employed. First the descriptive statistics is discussed followed by the econometric analysis.

4.1 The Descriptive Statistics-Program Implementation

Assessing the descriptive statistics helps to see the quick achievements in terms of the stipulated objectives of the intervention under focus. In this part we have dealt about the implementation of the program, and a glimpse at the costs of the program and challenges faced. This section has dealt border conflicts in a simple descriptive way so that we will have an overview in to the case.

The particular attention while investigating the impact of the intervention on land conflicts is on border disputes as there are many land related disputes. Regarding women empowerment, this study gives an emphasis on the social and psychological aspects of empowerment dimensions as there are also economic and political empowerment dimensions which are beyond the scope of this study.

4.1.1 Over View of Implementation and Achievements

Tigray Environmental Protection, Land Administration and Use Agency (TEPLAUA) have been implementing Ethiopia Strengthening Land Administration Program (ELAP) with financial support of USAID in Raya Azebo and Tahtay Adyabo weredas of Tigray Regional State since January 2009 (TEPLAUA 2012).

ELAP (Ethiopia Land Administration Program) is successor project of Ethiopia Strengthening Land Tenure and Administration program (ELTAP) that was implemented in the region. According to TEPLAUA, the objective of ELAP is to assist the government of Ethiopia strengthen and enhance rural land tenure security and administration through improving the legal framework; advancing public awareness in land rights and obligations and the major provisions

of land administration and land use laws; and promoting domestic and foreign investment in land through improved land administration legislation and registration and certification process.

Until the commencement of this study in to the area, 328,154 parcels have been surveyed and registered since 2009/10. From this about 24,025 households have received their landholding certificates, in which 19,098 (74.4%) are from Raya Azebo woreda of the study area. These are done under the three programs, namely ELTAP, ELAP, SLMP, and Government budget of the respective woredas.

Table 4. 1: Comparison of Arable Land Size Pre and Post Project

Project Name	Tabia	Pre-project Estimated Area (ha)	Post project Surveyed area (ha)	Variation	Change in %
ELAP	Tsegae	2,043	2,092.90	49.90	2.44
	Wargaba	2,298	3,186.25	888.25	38.65
	Genet	2,665	2,521.20	-143.80	-5.39
	Kara_Adishabo	3,073	3,474.40	401.40	13.06
<i>Sub total</i>		10,079	11,274.75	1,195.7500	11.8637762
SLM	Hawlti	3,059	4,348	1,289.0000	42.13
	Ebo	1,337	1,383.50	46.5000	3.477
	Horda	2,600	2,171.40	-428.6000	-16.48
<i>Sub total</i>		6,996	7,903	906.9000	12.96
Government	Aerba	2,050	2,630.40	580.4000	28.31
<i>Sub total</i>		2050	2630.4	580.4	28.31
Grand total		19,125	21,808	2,683	14

Source: TEPLAUA Terminal Report, 2012

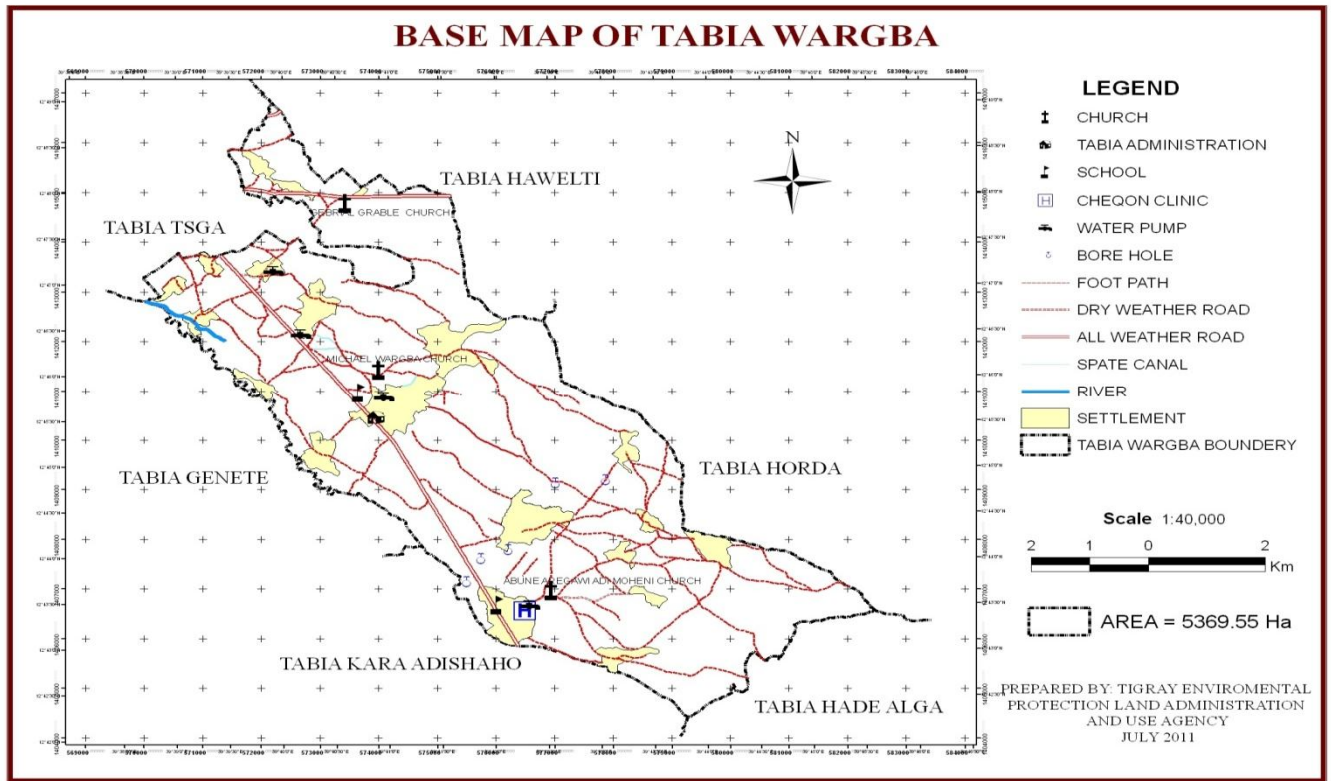
From all the three project implementing agencies i.e. ELAP, SLM (Sustainable Land Management project), and Government, it can be noticed from the report above, all of them has found a variation in the previously registered land and actually measured on the ground. The variation is very significant in terms of land size in which it amounts to about 42% in Hawelti

Tabia. Basically, the difference is in upward direction ranging from 11% to 28% in all the three projects. This variation is attributed to the traditional and inaccurate land measurement and surveying during the previous land registration; and in addition to that farmers underreport their land holdings taking this advantage for tax purposes and for they might hold the land illegally. From the individual and macro level information we gathered, those that have beyond the threshold of landholding size, most of them at peripheries, were not willing to be beneficiaries of the program for this reason.

Those landholdings at the peripheries are exposed to such situation of conflicts for the reason that farmers move to use the ‘free land’ near to their legal holdings, as revealed by the individual level interviews and interviews of the administrative bodies concerned to land administration and land use at woreda and regional level.

In the practical implementation, a base map for all Tabias is prepared in which it includes the necessary information of the tabias under consideration including the demarcation of the tabia with other tabias, basic infrastructures, and others. Preparing base map of tabia avoids or minimizes border conflicts between tabias as it has been a problem in many rural areas of the study area and Tigray region as a whole.

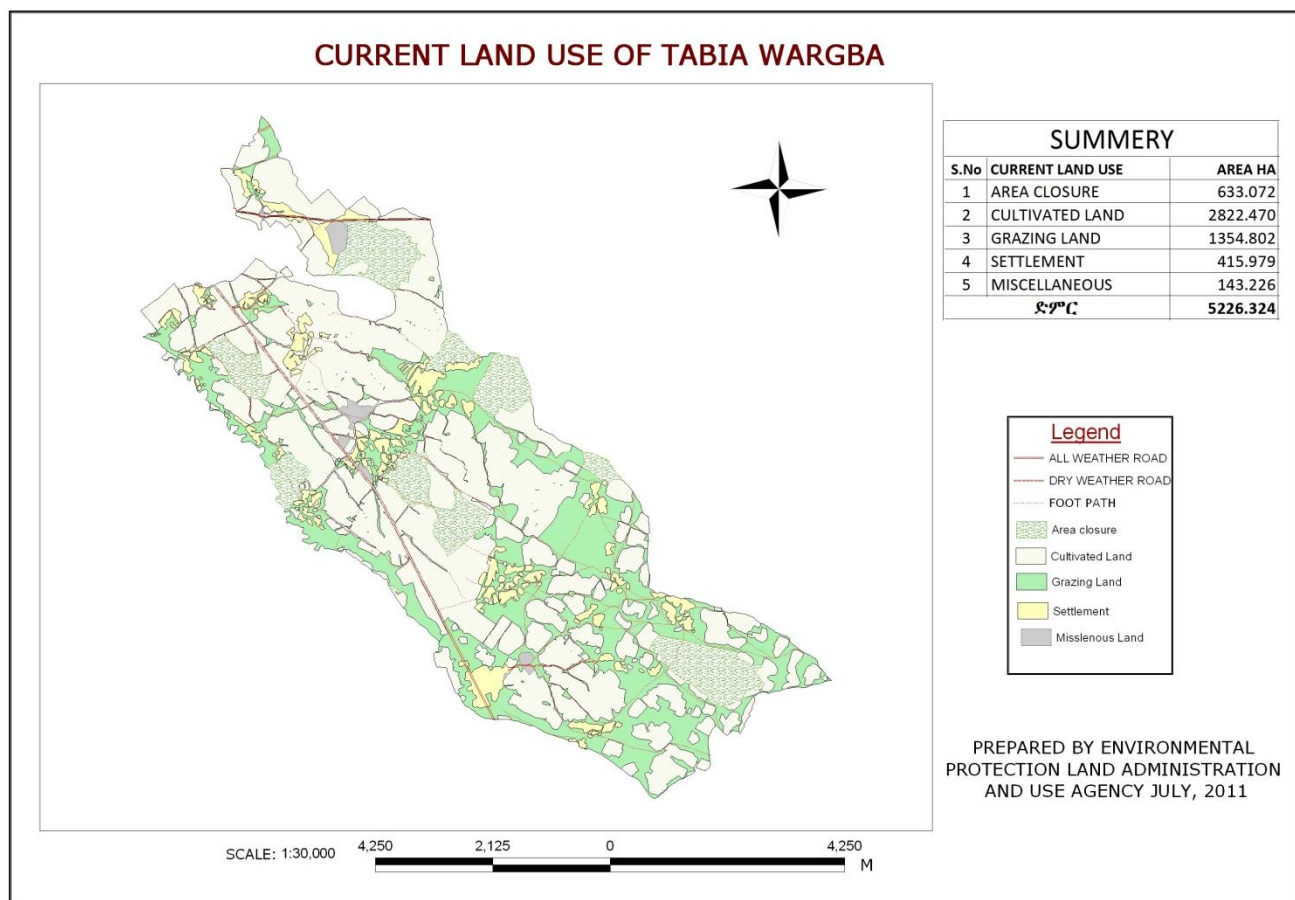
Figure 3: Sample of Base Map prepared for a given Tabia (Wargiba)



Source: TEPLAUA, 2012

Then a respective current land use map is prepared having the required data about the land in terms of its current use. In the data base at the woreda, there is a mechanism and software to update this information. Preparing current land use at hand enables for decision making and effective utilization of resources. Whenever an update is necessary, there is a mechanism to do so, based on stipulated time frame.

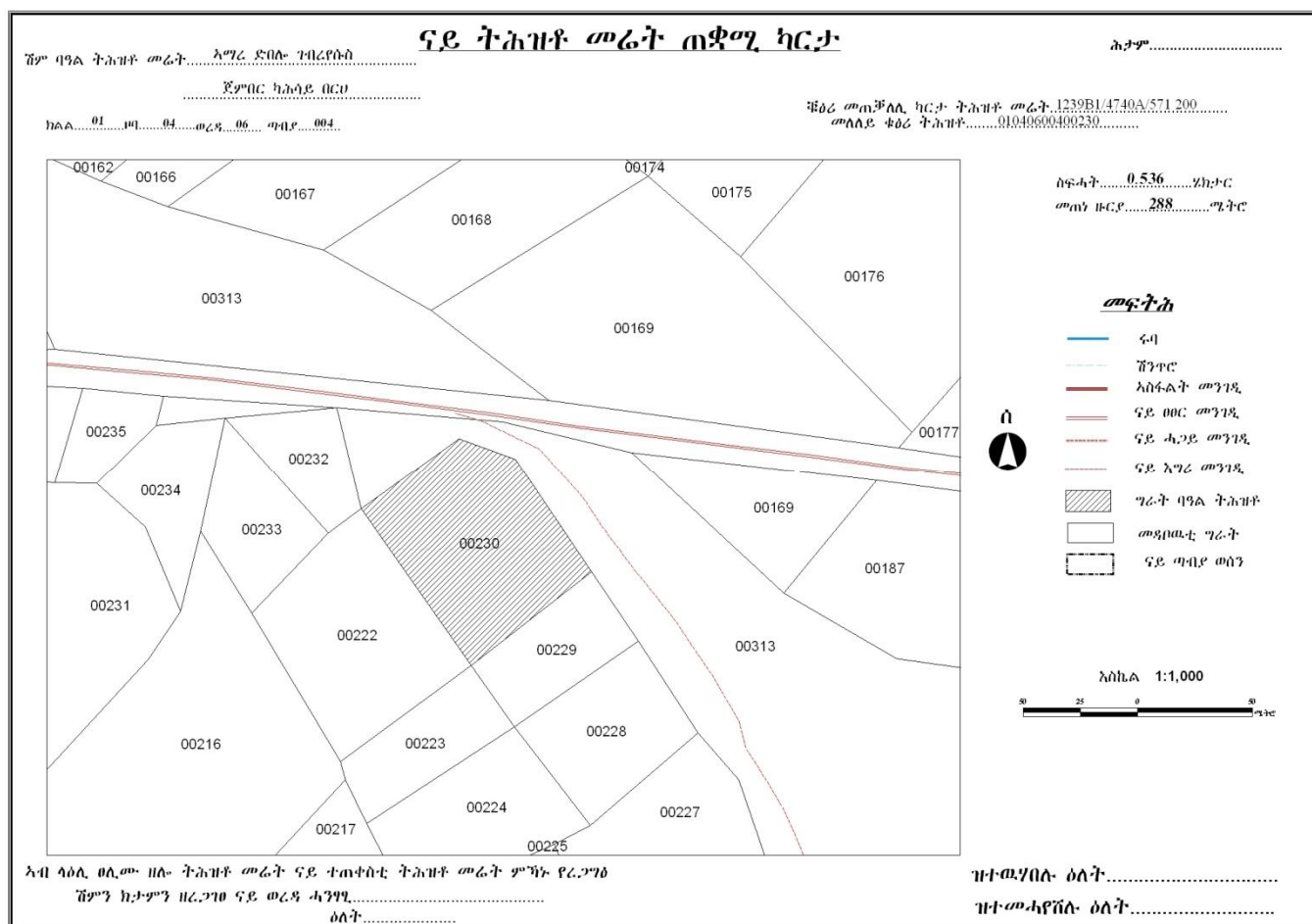
Figure 4: Sample of Current Land Use Map of Tabia (Wargiba)



Source: TEPLAUA, 2012

For the specific households, parcel based landholding map is prepared for each parcels of a given household including the basic information about the parcel. Then a book of landholding is prepared (yellow colored) which includes information of name of holder(s), parcel size, characteristics of the land, and responsibilities and rights of the holder in brief (see in the next figure).

Figure 5: Sample of Landholder's Map



Source: TEPLAUA, 2012

4.1.2 Brief Overview of Costs of the Cadastral Registration and Certification

Holden and Tefera (2008) has stated the estimated costs of land certification of the first level low cost certification that has conducted in Ethiopia to be 29.5 EB per household and 8.3 EB per plot when including the cost of land administration committee members. In fact, even low-tech approaches that issue only certificates in West Africa are estimated to have cost some US\$ 7-10 per parcel (Lavigne-Delville 2006). In Madagascar, where the official cost for titling on demand estimated to amount to US\$ 150 (Jacoby and Minten 2006), projections put the cost of issuing certificates in a simplified low-cost approach at US 7-28. In Uganda, the cost of issuing certificates of customary ownership, albeit with a precision that allows their immediate conversion to title, is some US \$ 40 per parcel. Moreover, at less than US \$ 1 per parcel

(Deininger et al. 2008b), the cost of Ethiopia's certification program is an order of magnitude lower than what is reported in the literature which puts the cost of traditional titling at between US \$ 20 and 60 per parcel (Burns 2007). The table below (Table 4.2) presents a brief of the cost norms as adopted by the Ministry of Agriculture.

Table 4. 2: Cadastral Surveying, Registration and Certification Payment Norm

S.No.	Activity	Unit	Payment Norm (ETB)
1.	Cadastral Surveying and Registration of Parcel		
<i>1.1</i>	<i>Surveying</i>		
1.1.1	Field survey of parcel	Parcel	5.50
1.1.2	Line (truck) feature surveying	Km	11.00
1.1.3	Point feature survey	point	1.60
1.1.4	Field survey of parcels (greater than 4 hectare), filling attribute table and completing editing	Km	11.00
<i>1.2</i>	<i>Registration</i>		
1.2.1	Filing the field registration format with parcel data	parcel	3.20
1.2.2	Point feature registration	point	1.00
1.2.3	Line (truck) feature registration	Km	7.00
1.2.4	Filling the field registration format with parcel greater than 4 hectare	Km	7.00
2.	Prepare and issue certificate		
<i>2.1</i>	<i>Mapping activity</i>		
2.1.1	Layout, parcel map (PIM) preparation and printing	parcel	3.50
2.1.2	Kebelle base map preparation	kebelle	60.00
<i>2.2</i>	<i>Certification activity</i>		
2.2.1	Filling the field data or parcel data to the registry book	parcel	0.75
2.2.2	Filling data from the registry book to the certificate	Certificate	1.00
2.2.3	Index card preparation (per land holder)	holder	1.00
2.2.4	Organizing the filled registry format in the box file	Box file	6.20
3.	Payment for informant farmer	parcel	1.50

Source: Ministry of Agriculture, 2012/13

From the table above, the costs specific to a given holder for a unit parcel is around 61 ETB. From our survey the average amount of parcels is two. Hence for a holder, on average, the cost of certification is Birr 122, excluding the administrative costs and other equipments and facilities associated to the program. The cost seems fair and affordable as the program demands high

technologies in its implementation, but far from the willingness to pay of households of around 58 ETB. Land registration is a very expensive activity, hence introducing some sort of mechanism in covering part of the costs by the beneficiaries would help in easing the burden and the certificate would be valued by the farmer holders.

4.1.3 Main Challenges so far as Perceived by the Implementing Agency

From the interview made with the agency head of TEPLAUA, and the personal observations of the researcher, the first level low cost land registration and certification conducted in the region at the end of 1990s, with its all shortcomings, has been used as base line information to determine the owner and to define the boundary line by the informant farmers participated during land distribution. This has helped to conduct second level rural land registration and certification under the projects a bit fast in the pilot areas.

Moreover, the experience gained and the awareness created by the previously implemented has paved a smooth way and provided best opportunity for the program to move faster. In addition to those stated above, the growing demand by administrators at different level for an effective system to administer rural land was the best opportunity for speedy and smoothly executing the program.

However, this doesn't mean the program is not facing some problems and challenges as the respective bodies have disclosed in their interview. Among the technical issues, challenges of undefined boundary demarcation are a serious delaying factor in implementing the program. This is specially related to lack of clearly defined boundary among neighboring weredas and kebeles in the project areas, which has delayed surveying and registration works. Due to these facts surveying and registration of individual parcels especially in Wargba and Tsegae kebele of Raya_Azebo wereda were preceded without first completing the base map of the two kebeles.

Another challenge comes from unsecured data handling for there is no any clearly defined regulation that states the duties and responsibilities of the expert who are operating registered and surveyed data both in soft and hard copy. This could ultimately create more insecurity because irresponsible works such as illegally modification of the data may happen, as it is revealed in the progress report of TEPLAUA (2012).

The second level land registration and certification program is generating massive land records that need to be systematically recorded and managed and safely stored for later access and updating when land use right transactions occur. This requires a land information system to aggregate the land records at the kebele, wereda and regional level. But there is no such system installed yet. Besides to these, there are institutional challenges related manpower, skill, and the like.

4. 2 Descriptive Statistics on Characteristics of Households and Impact of Program

4.2.1 Plot and Household Level Characteristics

To investigate the impact of the intervention on the households, having a glimpse in to the key variables of plot and household characteristics is very important. With this virtue the basic household and plot level characteristics of the sample households are presented by Tabia here under.

Table 4. 3: Basic individual and plot level Characteristics of sample households by Tabia

Characteristics	Hawelti	Tsegea	Wargiba	Hadealga	Mechari	Kukufto	Total Mean
Mean Age of household head	51	51.2	45.5	45.7	49.31	45.6	47.8
Average education of household	.26	.16	.21	.23	.27	.16	.22
Mean family size	5.5	5.9	5	5.5	5.8	5.4	5.5
Mean plot age	19.3	18.6	172	17	17.8	16.1	17.5
Average TLU before treatment	5.2	4	10.8	7.5	5.6	6.5	6.6
Percentage of female headed households	25.7	30.2	10.5	14	21.6	18.2	19.7
Average land holding size per household	5.2	4.8	5.4	5.8	5.8	4.9	5.3
Average education of household	3.2	3.4	2.2	2.1	3.3	2.1	2.7
Average Number of adults in the household	3.1	3.6	2.6	3	3.5	2.9	3.1
Number of households	35	43	38	57	51	55	279

Source: Own Survey, 2013

We can see that average farm sizes are almost similar in all tabias, ranging from 4.8 (in Tsegea) to 5.8 (in Hadealga & Mechari) measured in *timad*. Wargiba is the tabia with the highest tropical livestock unit, even far beyond the total mean, as valued in oxen equivalent. The mean age of the respondents in each Tabia is not far from the mean age of the whole sample. The case is similar for the family size in each Tabia. Our sample has around 20% of female headed households.

As can be seen from the Table below, there is no statistical difference in the basic variables among the treated and comparison households.

Table 4. 4: Some of the Basic Descriptive statistics of Households, by gender of household head

	Non Certified		Certified		Diff.	t-test
	Mean	Std. Dev.	Mean	Std. Dev.		
Household Characteristics						
Age of head	46.8	13.14	49.3	14.00	-2.5	0.13
Education of head	.22	.42	.21	.41	.01	0.78
Household size	5.57	2.34	5.48	2.2	.088	0.755
Ratio of dependent members	2.22	1.27	2.37	1.42	-.14	0.39
Total land owned, tsimdi	5.50	3.08	5.11	2.54	.39	0.26

Source: Own Survey, 2013

From the table 4.4 above female headed households have slightly lower landholding as compared to the male comparisons. Similarly the mean schooling, though low in both cases, is better in the male headed households. However, the difference is not statistically significant in both groups.

4.2.2 Program Impacts on Border Conflicts

This section discusses the impact of the program on border disputes as perceived by the households focusing in to the change of border conflicts and the level of conflicts in the stipulated time frame. Some of the reasons that the researcher does not use court cases as a data

source to analyze the issue of land conflicts are; for one thing the researcher believe that the record keeping would not be easy to grasp the intended data at all level of courts, and in addition to that all cases might not went to courts and it would be difficult to have accurate figure of the number of cases at each level of courts, and as a single case might be dealt in different level of the courts.

Table 4. 5: Rural Land Related Dispute: Cases in Five Selected Weredas of Tigray in 2011/20012

S.no	Zone	Wereda	Court name	# of cases	Remark
1	Southern	Raya_Azebo	Mehoni court	572	
			Chercher court	216	
			<i>Sub total</i>	<u>788</u>	
2	South east	Enderta	Didbadergajen court	359	
			Enderta court	670	
			<i>Sub total</i>	<u>1029</u>	
3	Eastern	Gantafeshum	Gantafeshum court	609	
			Bzet court	239	
			<i>Sub total</i>	<u>848</u>	
4	Central	Adi_Ahferom	Ahferom court	495	
			Egela court	277	
			Hahayle court	788	
			Edagarbi court	93	
			<i>Sub total</i>	<u>1,683</u>	
5	North west	Tahtay	Tahtay Koraro court	794	
		Koraro	Semema court	264	
			<i>Sub total</i>	<u>1058</u>	
			<i>Total</i>	<u>5,376</u>	

Source: TEPLAUA, 2012

Though it is difficult to conclude from only the data that is reported to courts, this report by itself reveals that land is the basic source of conflicts by taking the number of cases. Taking the court cases, Raya Azebo wereda, the focus of this study, have low cases reported to the court. Part of it

might be due to the program, but we need to check this in our subsequent discussions latter through the parametric relationships.

Table 4. 6: Type of conflicts common in the study area

Type of conflict	Treated	Percentage	Non Treated	Percentage	Total	Percentage
Border disputes	67	57.8	103	63.2	170	60.93
Divorce disputes	9	7.8	3	1.9	12	4.30
Inheritance disputes	23	19.8	29	17.8	52	18.64
Plot ownership	9	7.8	13	7.9	22	7.89
Others	8	6.8	15	9.2	23	8.24
Total	116	100	163	100	279	100

Source: Own Survey, 2013

In both cases, treated and control households, land border disputes take the lion share among the dispute types in their vicinity followed by inheritance disputes. There is slight difference in the percentage of border disputes among the participants of the program and the non participants. It is not early to signify that this could be due to the program; rather we will confirm it in our parametric discussion latter. Inheritance related disputes is another serious problem in the study area as we can notice from the above table.

The reason that border dispute is still a common type of conflict in the treated households even one year and half after the intervention, among others, is there are many cases pending which have been started prior to the start of the program. However these border conflicts are not sourcing from the program implementation itself, as the respondents themselves confirmed that the program implementation was smooth as the registration and certification is just approving pre-existing landholding with accurate and modern approach of measurement as compared to the previous low cost land registration and certification process.

At this point, it should not be given low emphasis for the disputes related to the inheritance as it is the second common type of disputes in the study area.

4.2.2.1 Outcome Variables by Treatment Category

To check our hypothesis, looking in to the outcome variables by treatment category is important, as it helps to have a glimpse on the changes and differences among the two groups. In the conflict indicators, respondents were asked if they had border disputes in the last 18 months. In this case, 48% of the non-certified reported that they had encountered border disputes with their neighbors as compared to the 38% of the certified households. This shows the non-treated households had 10% more border conflicts since the time of the program implementation. When we look in the risk of encroachment, 91% of the non-certified households stated that they have risk of encroachment, and 87% of the respondents in treated area reported the same case.

Moreover, respondents were asked if border dispute is a concern for them, and 64% of the non-certified revealed that border dispute is a concern for them, while only 32% of the certified reported the same issue. As we can see from the table below, the difference is statistically very significant.

Table 4. 7: Outcome variables by Treatment

Outcome Indicators	Non Certified		Certified		Diff.	t-test
	Mean	Std.	Mean	Std.		
		Dev.		Dev.		
Conflict related indicators						
Have you had border disputes in the last 18 months?	.48	.50	.38	.49	.099*	0.1003
Risk of encroachment in the last 18 months as compared to the previous times	.91	.28	.87	.28	.04	0.24
Is border conflict a great concern for you?	.64	.48	.32	.47	.32***	0.000
Gender indicators						
Do women themselves perceive that they are equal with men?	.84	.37	.85	.36	-.013	0.77
Is women beating justified for any of the four reasons?	.196	.398	.18	.386	.015	0.75
Decision index	.81	.36	.795	.37	.012	0.78
Self esteem index	.33	.46	.35	.40	-.012	0.800

Source: Own Survey, 2013

When we look in to the gender empowerment indicators, respondents were asked on how they perceive on the equality with men. 84% in the non-treated perceive women are equal with their men counterparts, and 85% of the respondents in the certified area feel the equality of women with men. This shows there is no significant difference in terms of both magnitude and statistics. Respondents were asked if beating of wife is justified taking four scenarios: if she burns food, if she argues with husband, if she goes out of home without telling her husband and if she neglects the children. About 20% of the non-treated are in favor of beating one's wife for the above stated reasons, while 39% in the certified believe beating is justified in case of the above scenarios. However, the difference is not statistically significant based on treatment category. Alternatively, indexing these with equal weight, the non-certified have 0.33 and that of the certified have 0.40 index of self esteem. Similar to the other indicators, this is also not significant statistically.

Another way in to looking gender empowerment is through participation in the decision in household related issues. Eight decision points in the households: daily household need, large household purchase, land rent out/share cropping if needed, adoption of modern input/fertilizer, improved seed adoption, leaving fallow, type of crop/seed selection and decision on credit are weighted equally, following Tassew et al (2008) to come up with the decision index. The non-certified households have decision index of 0.81 and the treated group have 0.80.

4.2.2.2 Perceived Impact on Border Disputes

One of our hypotheses says that land surveying and registration programs that lead to better demarcation of land borders and land reforms contribute to reduce land border conflicts after the implementation of the program (H3). This is assessed using both descriptive statistics and econometric analysis in the subsequent discussions.

On the issue that whether the households under consideration has encountered land disputes or not during 18 months (a time after the program is implemented), 37.9% of the treated stated that they had border conflicts as compared to 47.9% of the non-certified. On the other hand, respondents were asked if land border disputes are increasing or decreasing taking the pre and post program implementation as a reference times. In the treated area 75% of them claim there is less border disputes but 68% of the non participants said less disputes. Similarly, only 6% of the

treated believe that there are more border disputes in their vicinity, and 10.4% of the controls stated there were more disputes for the same period of time.

Table 4. 8: Border Disputes Before, and After the PBSLLH R C

	Treated	Percentage	Non Treated	Percentage	Total	Percentage
Have you had border disputes in the last 18 months?						
Yes	44	37.9	78	47.9	157	56.3
No	72	62.1	85	52.1	122	43.7
Total	116	100	163	100	279	100
Is there any change in border disputes in the last 18 months?						
Less disputes	88	75.9	111	68.1	199	71.3
No disputes	21	18.1	35	21.5	56	20.1
More disputes	7	6	17	10.4	24	8.6
Total	116	100	163	100	279	100

Source: Own Survey, 2013

The variation in responses of change in border disputes has to be analyzed using econometric analysis to identify some of the reasons for this variation, using the household level data based on our conceptual framework.

Table 4. 9: Perceived Impacts the PBSLLHCR

	Treated	Percentage	Non Treated	Percentage	Female headed	Male headed
How do you feel about the risk of encroachment in 18 months as compared to the previous time?						
Less risk	101	87.1	149	91.4	90.6	90.6
No change	15	12.9	14	8.6	9.4	9.4
Total	116	100	163	100	100	100
How do you evaluate the level of land disputes in last 18 months?						
improve	69	59.5	73	44.8	41.8	53.1
No change	36	31	70	42.9	50.9	34.8
Worsened	11	9.5	20	12.3	7.3	12.1
Total	116	100	163	100	100	100
Is there any change in border disputes in the last 18 months?						
Less disputes	88	75.9	111	68.1	88	75.9
No disputes	21	18.1	35	21.5	21	18.1
More disputes	7	6	17	10.4	7	6
Total	116	100	163	100	116	100
Is border conflict a great concern for you?						
Yes	37	31.9	104	63.8	41.8	52.7
No	79	68.1	59	36.2	58.2	47.3
Total	116	100	163	100	100	100

Source: Own Survey, 2013

From the above table, we see that 87.1% of the treated perceive less risk of encroachment, in contrast 91.4% of the controls perceive less risk of encroachment. On the issue of land disputes during the last 18 months, 44.8% of the participants of the program stated an improvement. On the other side, respondents were asked if border conflict is a great concern for them. From the treated, only 31.9% revealed that border dispute is a concern to them, as compared to 49.5% of the controls. Though we can see significant variation in the treated and non treated respondents in terms of perceived impact on border conflicts at this point, we should confirm it later if this is attributed to the program or not.

4.2.3 Implications to Women Empowerment

The table below presents descriptive statistics used in analyzing and discussing women empowerment. This table gives information on the degree of participation of women in decision making in the households.

Table 4. 10: Summary of Women Empowerment Indicators

Variables	Treated	Non Treated	All households
Empowerment index for decision making	.795	.808	0.802
Empowerment index for self esteem	.181	.196	.190
Perception of women equality with men :			
Yes	88.8	90.2	89.6
No	11.2	9.8	10.4
Contribution to family income:			
Husband	19.8	28.8	25.1
Wife	28.5	20.9	24
Equal	49.1	47.2	82.2
other	2.6	3.1	3.7
Decision on family income:			
Husband	21.6	28.2	25.4
Wife	20.7	17.8	19
Equal	55.2	50.9	52.7
other	2.6	3.1	4.9

Source: Own Survey, 2013

In terms of the decision index as an indicator of bargaining power and hence empowerment, both the treated and do not have that much difference. The same is true for the index of self esteem. In a similar case, we can notice nearly the same perception of women equality with men in both the treated and control groups. Taking contribution of family income as indicator of bargaining power, there is slight difference between the treated and non treated respondents, in the treated 49.1% of them stated they have equal contribution as compared to 47.2% of their counterparts. Moreover, 55.2% of the treated respondents replay that they have equal say on the decision of

family income, compared to 50.9% of the controls. This might show a tendency of increased participation by women in the treated area as compared to the non certified respondents, though this should be confirmed in our later discussion in the parametric relationship whether this outcome is due to participation in to the program or not.

In our survey instrument, we have asked the respondents about their perceptions of the effect of women's name on the land certificate on their rights and decision making power related to land.

Table 4. 11: Perceptions on the Effect of Women's Name on the Land Certificate on Land Related Decision Power

Variables	Treated	Non Treated	All households
Has no effect	11.2	17.8	15.1
She has stronger position in case of divorce	80.2	73.6	76.3
She involves more in land related decisions	5.2	6.1	5.7
She controls more of the income from production	1.7	0.6	1.1
She involved in land renting decisions	1.7	1.9	1.8

Source: Own Survey, 2013

In both cases (treated and controls), they perceive that having the name of wife on the certificate would benefit women to have stronger position in case of divorce. This is followed by the respondents who responded 'no effect'. From this, one can observe that their perception on the benefits of other land related issues is not given that much attention by the respondents.

Above all there are few respondents who believe that women would become more involved in land renting decisions. But it is difficult to pinpoint peculiarities of the treated and non treated respondents. This would be due the low expectation from the program benefits by the participants and non participants and perhaps because many of them did not yet know the associated benefits with having their names on the certificate other than the legal claim in case of divorce. If beneficiaries are not well informed of the nature of the program and if they are at low

level of alertness to their rights, the intervention might not bring about the intended results, especially those outcomes related to social and psychological impacts.

4.3 Econometric Results

4.3.1 Estimation of the Propensity Score

In this section, the logistic regression results are presented, in which it is employed to estimate the propensity scores in matching treated households with the comparison households. The dependent variable takes binary choice whether the household under consideration receives the PBSLLHRC, with the value 1 if certificate is received (i.e. if the household is from the treatment village) and 0 otherwise.

The table below shows the logit estimation results of both the overall sample households and sample for households at current marriage. The common support option has been selected and the balancing property is satisfied (see Appendix). The pseudo-R² of the overall sample households is 0.049 which seems fairly low. But for the sample of households at current marriage the pseudo-R² value is 0.101, far better than the overall sample. According to Pradham and Rawlings (2002), this low pseudo-R² value indicates that participation in to the program has been fairly random. This means households in the intervention area do not have as such very different characteristics in terms of observed pre-treatment characteristics.

Variables included in the propensity estimation are those variables pre-treatment, in a sense that either they should be time invariant or those that may vary with time but not affected by the intervention under focus. Rosenbaum and Rubin (1983) asserted that these should control variables commonly used in impact literature adapted to the nature of program. Since the program is piloted in some villages, including village dummy would perfectly predict participation in to the intervention. Hence village dummies are excluded in the estimation.

Table 4. 12: Control variables and propensity score estimation (Logit Model)

Regressors	Dependent Variable: PBSLLHCR participation					
	Overall sample households(1)			Sample for households at marriage(2)		
	Coef.	Std. Err	P> Z	Coef.	Std. Err	P> Z
Constant	-0.187	0.721	0.795	0.731	0.828	0.377
Pre-program TLU	0.00463	0.0133	0.728	-0.00150	0.0140	0.915
Plot Size	-0.101*	0.0607	0.098	-0.0921	0.0710	0.194
Educ. of hh head	-0.147	0.336	0.662	-0.322	0.364	0.375
Age of wife	0.00103	0.0125	0.934	-0.0294	0.0190	0.122
Age of husband	0.0126	0.0135	0.349	0.00102	0.0271	0.970
Age difference	-0.000805	0.00495	0.871	0.0229	0.0161	0.155
HH average educ.	0.121*	0.0728	0.097	0.153*	0.0892	0.086
Plot distance	-0.131	0.0903	0.146	-0.259**	0.110	0.018
Plot age	0.0194	0.0203	0.338	0.0454*	0.0237	0.056
bak_type	-0.599	0.544	0.271	-0.452	0.636	0.478
walk_type	-0.915**	0.412	0.027	-0.679	0.455	0.136
hut_type	-0.558	0.454	0.219	-0.595	0.501	0.235
mek_type	-0.560	0.408	0.169	-0.168	0.464	0.718
Adult male	-0.0621	0.164	0.705	0.160	0.184	0.386
Adult female	0.0460	0.170	0.787	-0.100	0.206	0.626
Family size	-0.0479	0.0860	0.578	-0.176*	0.0986	0.075
No. of parcels	0.318	0.235	0.176	0.131	0.275	0.632
Significant at: ***1%, ** 5%, *10%.						

Source: Own Survey, 2013

Household farm size in 'tsimad' is statistically significant in the overall sample but not in the sample of at current marriage. On the other hand, average education is found statistically significant in both samples, showing that households with higher average education are having the probability of receiving certificate. Plot distance from homestead is significant in the sample of those at current marriage, indicating those households at current marriage with higher plot distance to homestead have lower probability of receiving or participating in to the program. Similarly, households with higher plot age have the more probability of participating in the program, taking the sample of currently at marriage. In the overall sample, households with 'walka' type of soil have lower probability of participating in the program (significant at 5%

level). Households with more family size have lower probability of receiving certificate in the sub-sample of those at current marriage (significant at 10% level).

In the table above, since the interest of the researcher is to create common support and hence and make the participation in to the program as random as possible, a logit parametric estimation has been employed to pin point the impact of the program.

4.3.1 Impact of Certificate on Border Conflicts

Table 4. 13: Summary of logit model on border conflict

VARIABLES	Bconflict(1)	Marginal effects
certi_type2	-0.489*(0.292)	-.1184784
Education of household head	0.499(0.357)	.1234657
Average education of household	-0.0112(0.0111)	-.0027347
Plot distance from homestead	-0.137(0.0994)	-.0336582
walk_type	-0.816*(0.450)	-.2004314
hut_type	-1.071*(0.552)	-.2392599
mek_type	-1.258*** (0.426)	-.2822481
own_land	0.0897(0.0668)	.0219913
Sex of household head	-0.991*** (0.355)	-.2428728
TLU	-0.0285(0.0295)	-.0069916
Clearly Demarcated border	-1.505*(0.830)	-.3472692
Perceive secured	0.708*(0.419)	.1736299
Attend in meetings in land issues	0.301(0.288)	.0733784
Plot age	-0.0135(0.0194)	-.0033217
Steeped sloped plot (1)	0.545(0.719)	.1274719
‘Meda’ sloped plot(3)	1.652** (0.694)	.3819682
Medium depth soil type	0.529(0.367)	.1302197
Deep soil type	0.534(0.375)	.1300708
Number of Parcels	0.188(0.252)	.0460294
Membership in LAC	-0.154(0.384)	-.0374888
Family size	-0.0165(0.0637)	-.0040464
Constant	1.118(1.279)	
(1)Observations: 272 LR chi2(21): 44.68p>chi2: 0.0019 Pseudo R2: 0.1199		
Log likelihood = -164.06453		
Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1		

Source: Own Survey, 2013

In the above model, the researcher used border conflict incidence of the households under consideration in the time span of the program implementation onwards. The depended variable is of binary choice whether the household had border conflict (1=yes) otherwise 0, in the past 18 months. From the results one can notice that participation in to the program (certificate) is statistically significant (at 10% level). Similarly, the direction to border conflict incidence is as hypothesized and as expected i.e. those who are participants of the parcel based second level landholding certification and registration have lower probability of border conflict (12% lower) as compared to that of their counterparts. This is more or less in line to our descriptive statistics that we have dealt earlier H3 of our hypothesis. This finding is in line to what Holden et al (2009) has found in the low cost land registration and certification.

Plot distance, thought statistically insignificant, shows those that are far from the residences of the households are having less probability of conflicts as compared to those nearest to their residence. This seems a bit strange result due to that plots at far distance are exposed to hidden activities by neighboring farmers as they are out of sight. However, this could be due to that plots far from home are found to be at the peripheries in which there is an opportunity to 'freely' hold land so that exposed to conflict among neighbors. On the other hand hutsa type of soils has less probability of border conflicts (significant at 10% level) as compared to 'bakel' soil type. This is expected result since such land types are less fertile and hence not attractive for border conflicts as its opportunity cost will be high. In a similar way mekayih type (significant at 5% level), also less fertile, is less exposed to conflicts. Another measure of fertility of soil is their slope. 'Meda' sloped plot have more probability of conflicts (significant at 10% level) as compared to medium sloped plots. This could be due to the attractiveness to the plot due to its potential to productivity.

Male headed households (significant at 5% level) have less probability of conflicts. Male headed households have 24.3% less probability of conflicts as compared to their counterparts. Females take the role of family headship roles, when they miss their husband through divorce or widowhood. Females without husbands in most cases share crop their lands and in this case they are exposed to denial of those who took their land in the form of sharecropping. Moreover, women are victim of norms and beliefs that they are 'weaker' than their counterparts in securing their rights. This was clearly observed during the survey that many cases has been applied to

land courts of tabias, especially in the non treated areas. Hence the implementation of the program has leveraged the problem in the program areas but this would not totally avoid the problem, as the norms and traditions associated to gender are not broken yet.

Households with clear demarcation of their parcels (significant at 10% level) have lower probability border conflicts. But it is a clear paradox that those who perceive they are secured of border conflicts (significant at 5% level) are having higher probability of conflicts. However, this could be due to that those that are feeling security might come from the treated households.

4.3.1.1 Risk of Encroachment and Border Dispute Concerns

With regard to risk of encroachment by neighbors, respondents were asked about their perception whether they are exposed to such risk in the last 18 months as compared to the previous times. Similarly, we asked households if border dispute is a great concern for them.

The table below shows that in all the three models, certificate is statistically significant (at 10% in equation 1, and at 1% in models 2&3), the sign is also similar in all the models. Therefore we have a good reason to argue that participation in to the program have positively affected the beneficiary households as compared to their comparison groups, as is revealed in all the above alternative models. We see that the PBSLLHCR is considered to better protect the farmers against encroachment and decreases the concern of border conflicts.

In equation (2), the dependent variable is risk of encroachment taking 1=risk of encroachment and 0=no risk. With an increase in education of the household head (significant at 5% level), probability encroachment is high. This could be due to that, education may give the opportunity search another option of livelihood which reduces the opportunity cost of taking care of one's plot which gives favorable ground for the neighboring farmers to encroach the plot. Mekayih (less fertile soil type) is significant (at 10% level) which is similar to that of model (1). Therefore, less fertile soil type is having low risk of encroachment for the reasons stated above. The perception good security works in a similar implication to risk of encroachment (2) (significant at 1% level) which is self explanatory.

Table 4. 14: Summary of Border conflict, Risk of encroachment and Concern of border conflict (Logit)

VARIABLES	(1) Bconflict	Marginal Effect	(2) encroachment	Marginal Effect	(3) dispcare	Margin al Effect
certi_type2	-0.489*(0.292)	-.1184784	-1.245***(0.527)	-.073384	-1.510*** (0.29)	-.3591
Educhh	0.499(0.357)	.1234657	1.669***(0.846)	.0597278	0.134(0.353)	.0335
avgeduc2	-0.0112(0.0111)	-.0027347	-0.00684(0.0179)	-.0003521		
Plotdist	-0.137(0.0994)	-.0336582	0.123(0.197)	.0063179	-0.0261(0.0973)	-.0065
walk_type	-0.816*(0.450)	-.2004314	-0.482(0.770)	-.0231725	-0.0383(0.415)	-.0096
hut_type	-1.071*(0.552)	-.2392599	-0.730(0.903)	-.0467833	-1.049***(0.521)	-.2490
mek_type	-1.26*** (0.426)	-.2822481	-1.622***(0.699)	-.1239838	-0.834***(0.381)	-.2034
own_land	0.0897(0.067)	.0219913	-0.00403(0.0942)	-.0002078	0.0413(0.0670)	.01031
Sexhh	-0.99*** (0.355)	-.2428728	0.196(0.536)	.0106332	0.430(0.36)	.1066
Tlu	-0.0285(0.0295)	-.0069916	0.0134(0.0370)	.0006882	-0.0047(0.0201)	-.0012
Demarcation	-1.505*(0.830)	-.3472692	2.293*** (0.883)	.2893039		
q4_1_26secured	0.708*(0.419)	.1736299	-1.395*** (0.474)	-.0718675	-0.125(0.35)	-.0311
Attend	0.301(0.288)	.0733784	0.320(0.482)	.0168293	0.44(0.285)	.1097
plot_age	-0.0135(0.0194)	-.0033217	-0.0550(0.0345)	-.0028321	-0.0358*(0.019)	-.0089
slop1	0.545(0.719)	.1274719	0.798(1.166)	.055011	-0.312(0.644)	-.0773
slop3	1.652** (0.694)	.3819682	0.421(1.056)	.018955	0.272(0.514)	.0676
sd_medium	0.529(0.367)	.1302197	-0.574(0.592)	-.0324869	-0.0613(0.352)	-.0153
sd_deep	0.534(0.375)	.1300708	-0.0368(0.648)	-.0018944	-0.850***(0.360)	-.2094
q2_1_parcel	0.188(0.252)	.0460294	0.271(0.448)	.0139777	0.279(0.262)	.0697
q5_1_22membland	-0.154(0.384)	-.0374888	2.028** (0.966)	.0627914		
Famsize	-0.0165(0.0637)	-.0040464	0.0136(0.107)	.0007003	-0.0268(0.0632)	-.007
Constant	1.118(1.279)		2.233(1.755)		1.159(0.818)	

(1) Observations: 275 LR chi2(21): 44.68 p>chi2: 0.0019 Pseudo R2: 0.1199 Log likelihood = -164.06453

(2) Observations: 275 LR chi2(21): 37.56 p>chi2: 0.0145 Pseudo R2: 0.2034 Log likelihood = -73.534038

(3) Observations: 275 LR chi2(21): 54.32 p>chi2: 0.0001 Pseudo R2: 0.1441 Log likelihood = -161.36897

Standard errors in parentheses:*** p<0.01, ** p<0.05, * p<0.1

Source: Own Survey, 2013

The third alternative model is having a dependent variable of concern of border disputes with 1=yes and 0=no. In model (3), those plots with higher age (significant at 10% level) are having

lower concern of border disputes. Bear in mind that the intervention is not about new land distribution, but of title registration and certification of the preexisting landholding with accurate measurement and modern data base management. This implies recently acquired lands are becoming source of conflicts. Among others, unsettled court cases attached to the land under consideration is one reason for this as it is also observed in the study area. 'Hutsa' and 'mekayih' soil types (both significant at 5% level) have lower probability of concern for border disputes since such soil types are less fertile.

In a similar equation, those households with deep soil type (significant at 5% level) are having lower level of concern for border disputes. But since such soil type is fertile, households would be more concerned about border disputes. Since this variable is not significant on the other models, it is difficult to conclude and take this unexpected result as it is.

4.3.1.2 Change and Level of Border Conflicts

Households' perception about the change and level of border conflicts is presented here under. In the atwo equations below in table 4.15, respondents were asked to state their perception of the level of conflicts during the last one year and half. In model (1) the respondents were asked to put their perception on the level conflicts in the last 18 months i.e. less conflicts, no change and more conflicts. Similarly in model (2) is if border conflicts were improved, no change and worsened in the stated time period. Among the respondents, equation (2) above, 54% of them said level of border conflict has improved and 38% of them feel there is no change during the last one and half year. In on the other hand 77.4% of the respondents stated for less conflicts.

Form the marginal effects results, we see that the marginal effects of certificate and the interaction variable of clear demarcation and participation in to the program (65% and 66% respectively in equation (1)) is far beyond the other explanatory variables in the model. Similarly, in equation (2) of the table 4.15 below, the marginal effect of certificate is about 66%. Hence, those who report for less conflict and for improved border conflicts are basically coming from the treated respondents.

Table 4. 15: Summary of Ordered Logit for the Change and Level of Border Disputes in the Past 18 Months

VARIABLES	(1) chaBdispute	(2) Level of land disputes
certi_type2	-11.75 (1,023)	12.62 (565.2)
Demarcation interaction	11.50 (1,023)	-12.07 (565.2)
Education of household head	0.758** (0.370)	-0.282 (0.335)
Average education of household	0.0179 (0.0119)	0.0117 (0.0109)
Plot distance from homestead	0.0505 (0.113)	-0.0370 (0.0939)
bak_type	-1.780 (1.153)	1.072 (0.682)
walk_type	0.300 (0.550)	-0.101 (0.492)
hut_type	0.270 (0.682)	-0.550 (0.570)
mek_type	1.346*** (0.520)	-0.609 (0.455)
Farm size per household	-0.0784 (0.0755)	0.0798 (0.0639)
Sex of household head	-0.0912 (0.397)	0.463 (0.328)
TLU	0.0246* (0.0136)	0.00366 (0.0174)
Clear Demarcation of border	-0.266 (0.747)	1.284** (0.624)
Perception of security	0.951*** (0.349)	-0.346 (0.340)
Attend in meetings in land issues	-0.964*** (0.317)	0.228 (0.270)
Plot age	-0.0242 (0.0203)	0.000426 (0.0178)
Steep sloped plot	0.469 (0.821)	0.416 (0.779)
'Meda' sloped plot	0.609 (0.740)	1.058 (0.745)
Medium depth soil type	-0.348 (0.585)	1.221** (0.483)
Deep soil type	-0.295 (0.508)	0.971** (0.428)
Number of parcels	-0.113 (0.281)	-0.256 (0.244)
Membership in LAC	-0.374 (0.463)	1.111*** (0.400)
Family size	-0.0536 (0.0717)	-0.0991 (0.0606)
Cut1	.9703	.3638
Cut2	2.654	2.714
(1) Observations: 275 LR chi2(25): 58.81 p>chi2: 0.0002 Pseudo R2: 0.1401 Log likelihood = -180.43727		
(2) Observations: 275 LR chi2(25): 55.60 p>chi2: 0.0004 Pseudo R2: 0.1081 Log likelihood = -229.4724		
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Source: Own Survey, 2013

Overall, we found support of the first three hypotheses, but no support for hypothesis H4, which states that conflicts are higher in densely populated areas. The proposed measurement of this hypothesis was household per-capita land holding size. Though the sign of farm size is encouraging taking the change in the trend of disputes and risk of encroachment, it lacks statistical significance in all alternative indicators.

4.3.2 Impact of the Program on Women Empowerment

For contrast purposes, it is tried to consider overall sample in addition to the husband-wife family set-up, in investigating the impact of the program on women empowerment. By considering overall sample unit that includes the sub-sample of those at current marriage can be an alternative way to look in to possible variations in the parametric estimations after creating the common support through matching. Based on this the attempt of this study is to investigate the bargaining power of women in the household decision making through participation of the household in to the program using indicators of empowerment. To the point, the state of affairs in this section is to compare the status of bargaining power indicators of the women in the treated households and the comparison ones and to draw an inference for the obtained indicators of empowerment. With this we can sort out where the empowerment outcome, if any, is attributed to the intervention or other factors.

Table 4. 16: Category of Treated and non treated households

	Size	Responses	Frequency	Percentage	Cumulative
Sample households currently at marriage	226	No (Controls)	137	60.6	60.6
		Yes (Treated)	89	39.4	39.4
All households in the sample	279	No (Controls)	163	58.4	58.4
		Yes (Treated)	116	41.6	41.6

Source: Own Survey, 2013

The above table shows randomly selected sample households from six tabias in Raya Azebo wereda of Tigray Region. In our sample of 279 households, 226 of them are at marriage during the time of survey, and remaining 53 are not living in a common life of husband and wife due to different reasons like divorce and widowhood. Those that are living in common life of marriage would be used in our subsequent discussion of intra-household bargaining power and hence empowerment. In bargaining model, the center of discussion for this study gender perspective,

intra-household bargaining power and analysis of gender relationship issues requires husband and wife family setup as a unit of analysis.

The husband and wife family would make the women empowerment study very clear in aspects of household level bargaining power than those households including only on the spouses. Households who are currently out of the common life and so that the women take the household heading role would not face that much challenge of bargaining power for the simple reason that they have full power up on deciding household issues. In most rural areas of Tigray, husband is the major decision maker for the household level concerns.

With this framework of analysis, if the outcome variables are favoring toward participant households of the program as compared to the controls and if their difference is found statistically significant, we can conclude that the program (PBSLLHRC) has an impact of improving women bargaining power and hence one can deduce an inference about participation in to the program has an impact on rural women. This is handled through the parametric relationship of logit model after ensuring the common support by propensity score matching. Besides to this, the overall sample is considered in order to have some insight of compare and contrast.

4.3.2.1 Perception of Women Equality and Decision on Household Income

The ultimate rational here is that if a household participating the program (PBSLLHCR) has improved the outcome relative to the comparisons; one can deduce that those indicators are to spouses' threat point indicators in intra-household bargaining power model. Hence, as per the conceptual framework, if the given indicator(s) is favoring toward beneficiaries of the intervention compared to non-beneficiaries and if their statistics is significant, we have a good reason to have a conclusion that participation in to the program has an impact on enhancing women intra-household bargaining power and the overall inference is that the intervention has an appealing impact on rural women in household level empowerment in the indicators under consideration.

Table 4. 17: Logit Results of Women Perception of Equality with Men and Participation in Decision of Household Income: Whole Sample

VARIABLES	(1) womperc	Marginal effects	(2) decincome4	Marginal effects
certi_type2	-0.734 (0.729)	-.0068482	-0.465 (0.333)	-.0665889
Sexhh	0.348 (2.268)	.0033423	5.131*** (1.705)	.3732649
Agehh	-0.0161(0.0367)	-.0001388	0.0523**(0.0245)	.007658
avgeduc2	-0.0325 (0.0249)	-.0002806	0.0321*** (0.0122)	.0046941
marasset	0.0446 (0.0905)	.0003848	0.0591*(0.0355)	.0086486
perfampoor	-0.541(1.228)	-.0051571	-0.726*(0.426)	-.0985101
perfamedium	0.132 (0.612)	.0011422	-0.574*** (0.203)	-.0839544
marbef	-1.621 (1.026)	-.0226657	-0.423(0.426)	-.057997
educhh	3.817*** (1.456)	.0183311	-0.0245(0.381)	-.003567
Agdif	-0.00530 (0.0323)	-.0000457	-0.0349*(0.0197)	-.0051055
comperc	6.174*** (1.040)	.6284394	-0.110(0.451)	-.0164493
adumale	-0.268 (0.464)	-.0023124	0.181(0.203)	.0265632
adufem	-0.174 (0.527)	-.0015013	-0.0752(0.220)	-.0110054
famsize	0.327 (0.288)	.0028217	-0.163(0.108)	-.0239043
q1_1_4age02	0.0258 (0.0369)	.0002229	-0.0239(0.0168)	-.0034931
Constant Term	-1.597 (2.444)		-4.738** (1.910)	
(1) Observations: 275 LR chi2(15): 110.78 p>chi2: 0.0000 Pseudo R2: 0.6274 Log likelihood = 32.902206				
(2) Observations: 275 LR chi2(15): 50.26 p>chi2: 0.0000 Pseudo R2: 0.1634 Log likelihood = -128.68235				
Standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Source: Own Survey, 2013

In our study of the intra-household level empowerment, the focus is on the social and psychological dimensions of empowerment indicators. This is because, for one thing the economic empowerment if not backed by social and psychological dimensions will not be ensured; and for this particular intervention (PBSLLHRC), the economic aspect of empowerment is not an interest of investigation within the specified life span of the program.

Hence, in model (1), which relates perception on the equality of women with men with 1=yes and otherwise 0, there is no strong evidence (at least statistically) if participation in to the program has brought a change in the perception of women on equality with men counterparts. The same is true for the variable decision making on income earned of the household. The issue here is that if we are going to claim that women are more empowered, their fall-back position should show an increasing trend which could be manifested in the above mentioned outcome

variables among others. A woman who have increased threat point and hence increased equity in a given household should have a more ‘say’ in decision of income and feeling of equity with their husbands. Interventions such as focusing on land reforms, which is the attention of this study, are expected to increase their fallback option for women as the land reform makes women owners of the property by joint titling which was not the case in Tigray region during the previous low cost land certification. Unfortunately there is no sound evidence to claim this from the above that participants are more empowered than non participant counterparts taking the earlier mentioned outcome variables.

In the study area and we can say in rural Ethiopia as whole, husband is given more dignity and he is the principal decision maker and source of income for the given household. This is highly cemented by norms and beliefs of the community, so that it affects for women to take part in decision making and feeling of equity. Those that are living in community with such norms are influenced on their perception of the above stated outcomes. Awareness about the benefits of the given intervention and general level of alertness about their rights also play key role in this respect. These all demands time and might be the reason why the intervention is not bringing significant difference among the beneficiaries and non beneficiaries. This is in line to the findings of Holden et al (2009), which they found limited impact on women empowerment at the early stages of the implementation of the low cost land registration and certification.

Rather education of the household head and perception of the community on women equity are very sound statistically (both significant at 1% level). This shows that those women in households with more literate head have higher probability of perceiving as equal as men. The case is similar for community perception about women equity i.e. women in a community believing and perceiving about women equity would perceive themselves as equal as men.

In the second model which takes the dependent variable of decision on income of the household with 1=husband and wife and 0=husband only, asset brought in to marriage (significant at 10% level) plays a role in the husband and wife power relationship. Those women which come up into the common life with more assets during marriage have higher probability of participating in household income decision making. Family background of the wife also affects the bargaining power (significant at 5% level) in that those wives from the medium and poor family (as perceived by the household) are having less probability of participating in the decision of income

as compared to those from the rich family background. In addition to that age difference of the husband and wife (significant at 10% level) contributes women empowerment as highlighted in the income decision making indicator in a negative way. This may be attributed to the established norms in the community.

On the other hand education of the household head and average education of the household have positive role on the probability of women participation on the decision of household income. This could due to the general awareness level and alertness of women and the whole household about women equity.

Table 4. 18: Logit Results of Women Perception of Equality with Men and Participation in Decision of Household Income: those at current marriage only

VARIABLES	(1) womperc	(2) decincome4
certi_type2	-0.658 (1.537)	-0.431 (0.358)
Sex of household head	24.17 (2,935)	4.649** (2.317)
Age of household head	-0.277 (0.257)	0.0445 (0.0358)
Average education of household	-0.590 (0.373)	0.0372*** (0.0132)
Asset at marriage	0.513 (0.361)	0.0634* (0.0364)
Perceived poor family background	-2.425 (3.621)	-0.551 (0.448)
Perceived medium family background	0.597 (1.455)	-0.537** (0.215)
Marriage status before current marriage	-8.035* (4.682)	-0.846* (0.508)
Education of household head	15.99** (7.065)	0.133 (0.393)
Age difference of husband and wife	0.164 (0.196)	-0.0490 (0.0309)
Community perception on equality of women	50.64 (2,935)	-0.242 (0.471)
Number of male adults	-1.630 (2.135)	0.171 (0.206)
Number of female adults	-3.525 (3.923)	-0.0679 (0.229)
Family size	1.005 (1.437)	-0.131 (0.112)
Age of wife	0.388 (0.332)	0.00177 (0.0213)
Constant	-29.83 (2,935)	-4.371* (2.486)
(1) Observations: 222 LR chi2(15): 100.17 p>chi2: 0.0000 Pseudo R2: 0.8346 Log likelihood = -9.9289483		
(2) Observations: 222 LR chi2(15): 29.94 p>chi2: 0.0121 Pseudo R2: 0.1147 Log likelihood = -115.55338		
Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1		

Source: Own Survey, 2013

Table 4.17 is about the whole sample. However, we need to see the intra-household bargaining issue in a better way by dropping those households out of husband and wife relationship. In bargaining model, intra-household bargaining power and gender relationship analysis seeks husband-wife family interaction as a unit of analysis. Therefore, looking in to the sample that

excludes spouses without wife or husband is an appropriate sample requirement for studying the intra-household bargaining power relations.

There is no major change in the above table too, but in model (1) whether the wife has been married before or not (significant at 10% level) also affects the power relationship in cooperative bargaining set up. Those who have been married before (so that the current marriage is their second or so) have less probability of perceiving equality with their husband.

The issue of intra-household power relationship in the husband-wife family set up in most cases depend on their level of literacy, contribution to the household asset holding, for example the contribution during marriage, and their respective family background. In the tradition of Tigray, a woman's parents are expected to provide a dowry to the husband. Money and cattle are the most common gifts in this case. Dito (2011) argues that the higher the value of the gift, the better a wife's bargaining position would be within the household. Our questionnaire based individual interview revealed these situation (see equation 2 in the above table 4.18).

Table 4. 19: OLS results of decision index

VARIABLES	(1) decindex
certi_type2	0.0264 (0.0276)
Sex of household head	0.676*** (0.115)
Age of household head	-0.00189 (0.00239)
Average education of hh squared	-0.00471*** (0.00107)
Asset at marriage	-0.00175 (0.00279)
Medium perceived family background	0.0200 (0.0149)
Rich perceived family background	0.0218* (0.0128)
Marital status before current marriage	-0.0539 (0.0353)
Education of household head	0.0163 (0.0320)
Age difference of husband and wife	-0.00444*** (0.00170)
Community perception on equality of women	0.0637* (0.0378)
Number male adults	-0.00532 (0.0161)
Number of female adults	0.0160 (0.0179)
Family size	0.00302 (0.00859)
Age of wife	0.00151 (0.00170)
Constant	0.433*** (0.131)
(1) Observations: 222 R-squared: 0.354 Adj R squared 0.3069 F(15, 206) =7.52 Prob > F: 0.0000 Root MSE: 0.19088 Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1	

Source: Own Survey, 2013

This table 4.19 shows OLS results of households' decision making, up on eight points of decision within the household, for those at current marriage. Decision index takes the value between 0 and 1 which is the weighted mean of the eight decision points. In this case the higher the index the more empowerment level of the women under consideration.

Gender of the household head is found significant in this regression but as all are male headed, since the remaining dropped are those out of current marriage, it does not have appealing meaning beyond statistics. Average education of the household is statistically significant (at 1% level), but with strange relationship though the magnitude is not that much big. Women from the rich back ground have higher decision index which statistically significant at 10% level which is in line to above discussion. The age difference of husband and wife is also statistically sound with its negative effect on decision index. Another variable is the community perception about women equity signaling positive relationship with the decision index.

Table 4. 20: Results of Ordered Logit Decision Index

VARIABLES	ordindex(1)
certi_type2	0.466 (0.728)
Sex of household head	19.63 (15.51)
Age of household head	0.112 (0.338)
Average education of hh squared	-0.0855*** (0.0252)
Asset at marriage	0.00297 (0.0534)
Poor perceived family background	-18.09 (2,690)
Medium perceived family background	-8.677 (1,345)
Marital status before current marriage	-1.819** (0.894)
Education of household head	-0.157 (0.881)
Age difference of husband and wife	-0.269 (0.334)
Community perception on equality of women	1.262 (0.958)
Number of male adults	-0.552 (0.389)
Number of female adults	0.0182 (0.462)
Family size	0.204 (0.224)
Age of wife	0.0168 (0.0476)
cut1	
Constant	-10.21 (2,690)
cut2	
Constant	-9.094 (2,690)

(1) Observations: 222 LR chi2(15): 85.12 p>chi2: 0.0000 Pseudo R2: 0.5100 Log likelihood = -40.89248
Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: Own Survey, 2013

In this case the decision index is categorized in to three following Tassew et al (2008) with slight modification, giving orders of less empowered (1), moderately empowered (2) and empowered (3) setting cut points for the categories of empowerment levels. Similar to the other models, it is hard to believe that participation in to the program has brought significance difference as compared to the control groups. Whether the wife has been married before is statistically significant. Attributed to the established norms, women have less power in decision making and overall say in the household if their marriage is for the second time or more.

4.3.2.2 Self-Esteem as Alternative Indicator

Perception of women themselves and the community in which they are residing can be considered as a good proxy to see the level of empowerment that women do have. Self esteem can be manifested in different ways, but for the intra-household bargaining set-up, beating of women for any of the four reasons discussed earlier is best proxy.

Table 4. 21: Logit Results of Whether Beating for One's Wife Is Justified or Not

VARIABLES	(1)	Marginal effects
	Justbeat	
certi_type2	0.0670 (0.377)	.0101233
Sex of household head	0.930 (1.475)	.1063779
Age of household head	0.0209 (0.0305)	.0031465
Average education	0.00689 (0.0144)	.0010364
Asset at marriage	-0.0308 (0.0453)	-.0046401
Poor perceived family background	0.295 (0.578)	.0459451
Medium family background	0.406 (0.263)	.0611435
Marital status before current marriage	-0.0318 (0.487)	-.0047552
Education of household head	-1.314** (0.562)	-.1596185
Age difference of husband and wife	-0.0161 (0.0201)	-.0024192
Community perception on equality of women	0.0563 (0.506)	.0083611
Number of male adults	0.289 (0.222)	.0434886
Number of female adults	-0.368 (0.257)	-.055414
Family size	-0.116 (0.116)	-.0174826
Age of wife	0.0215 (0.0228)	.0032379
Constant	-2.878 (1.800)	

(1) Observations: 222 LR chi2(15): 22.65 p>chi2: 0.0919 Pseudo R2: 0.0977 Log likelihood = -104.57725

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Source: Own Survey, 2013

This is also highlighted in the UNFPA (2008) in the study of women empowerment in Ethiopian context. Overall, the study shows that only 19% of women in Ethiopia do not agree at all to wife beating. This shows the extent to which it is low status of women even themselves believe for wife beating for any reason.

The above table 4.21 is about whether women beating; for reasons like neglecting children, going out without permission and the like, is justified or not. With this we can sort out the level of self esteem and hence the bargaining power of women. There is no clear and statistically significant difference to argue that participation in to the program has an effect on this outcome variable in the stated time.

As is stated above psychological empowerment and empowerment in general, depends on awareness of the wife on belongingness, sense of gender equality within the family and the community at large. This in turn partly depends on the level of literacy of the household, in our case average education which is statistically significant at 5% level. Those that are in households with more level of education of head/husband have lower probability of believing or accepting that beating of wife for any reason is justified. This could be due to the reason that women in an educated family are benefited from the awareness of women equality.

Overall, the last three of our hypotheses could not be supported from the analysis, though the sign is encouraging. Part of the reason is attributed to the recent nature of the program and women related empowerment demands integrated change in different sectors.

Chapter Five

Conclusion and Recommendations

This chapter presents the conclusions made based on the findings and recommendations thereafter. The aim here is to shed highlights of this study and underline the findings in connection with the stipulated objectives of the study; and policy recommendations and further research suggestions are forwarded.

5.1 Conclusion

Whole of the analysis of this paper is about the newly introduced ‘parcel based second level landholding certification and registration’; its impact on border conflicts and women empowerment, as studied in southern zone of Tigray, Ethiopia. The paper uses information from 279 households, 116 treated and 163 comparisons of Raya-Azebo woreda. This is supplemented from the reports of the TEPLAUA and interviews made to concerned bodies at woreda and regional level of the agency.

In its implementation process and speed, the program has success stories, taking some lessons and using as a starting point of the first level landholding certification and registration. However, the newly introduced intervention is not free of technical and institutional challenges.

Our study looks in to the impacts of border disputes taking the indicators of the perceived level and trend of disputes since the commencement of the program. Similarly it has tried to look in to the impacts on women empowerment using the intra-household bargaining theoretic concepts of game theory.

The intervention seems to bring marked results in terms of reduction in the level of border conflict, risk of encroachment and concern of border disputes. Farm size failed to significantly affect the change in border disputes. Nevertheless, other plot characteristics like clear demarcation, soil type, slope of the land, plot distance from the residence of the households are found to significantly affect the variation in the probability of border disputes. Household characteristics, like average education and age also have their own contribution in the variation of the outcome variables.

In all the treated and non treated, gender of household head explains the variation in conflict in such a manner that those households with male headed have lower probability of border disputes as compared to the female headed households. In our interview, most women if divorced or widowed sharecrop it in which they are exposed to disputes.

There is no strong evidence (at least statistically) if participation in to the program has brought a change in the perception of women on equality with men counterparts. The same is true for the variable decision making on income earned of the household. The issue here is that if we are going to claim that women are more empowered, their fall-back position should show an increasing trend which could be manifested in the above mentioned outcome variables among others. A woman who have increased threat point and hence increased equity in a given household should have a more 'say' in decision of income and feeling of equity with their husbands. Interventions such as focusing on land reforms, which is the attention of this study, are expected to increase their fallback option for women, as the land reform makes women owners of the property by joint titling which was not the case in Tigray region during the previous low cost land certification. Unfortunately there is no sound evidence to claim this that participants are more empowered than non participant counterparts taking the earlier mentioned outcome variables.

It is hard to believe that participation in to the program has brought significance difference as compared to the control groups in terms of women bargaining power in the intra-household relationship. Average education of the household and whether the wife has been married before are statistically significant. With increased average education in a given household, women might lose their autonomy in decision making if they are not educated or below the average education of the household. In this case the women believe that the 'educated' family members should decide on household issues.

As is stated above psychological empowerment and empowerment in general, depends on awareness of the wife on belongingness, sense of gender equality within the family and the community at large. This in turn partly depends on the level of literacy of the household, in our case average education. Those that are in households with higher education of head/husband have lower probability of believing or accepting that beating of wife for any reason is justified.

Hence education works in way that with increase in level of education, self esteem of women also move to the same direction.

In the study area and we can say in rural Ethiopia as whole, husband is given more dignity and he is the principal decision maker and source of income for the given household. This is highly cemented by norms and beliefs of the community, so that it affects for women to take part in decision making and feeling of equity. Those that are living in community with such norms are influenced on their perception of the above stated outcomes. Awareness about the benefits of the given intervention and general level of alertness about their rights also play key role in this respect. These all demands time and might be the reason why the intervention is not bringing significant difference among the beneficiaries and non beneficiaries.

Rather education of the household head and perception of the community on women equity are very sound to affect the variation in the outcome variables of bargaining power. This shows that those women in households with more literate head have higher probability of perceiving as equal as men. The case is similar for community perception about women equity i.e. women in a community believing and perceiving about women equity would perceive themselves as equal as men.

In general, the overall objectives of the intervention are, among others, reduction in border conflicts, and empowering women through joint titling. In its initial phase, the program is succeeding in border conflicts, though cannot avoid it totally. Border conflict is still the problem both in the treated area and comparison area, though there is improving trend as hypothesized. With regard to gender empowerment, our focus of analysis was on decision making, contribution to family income and self esteem of women. With the results we find, we failed to conclude that the intervention has brought significant difference, though the sign of change is encouraging.

5.2 Recommendations and Further Research Directions

Research findings and discussions in this paper lead us to the following recommendations and tips of research directions:

1. The significant impact of the parcel based land registration and certification on land border disputes shows the timely and importance of the program. This program should be scaled out to the rest parts as the initial level impacts prove with reduction of border conflicts in the piloted areas.
2. However, border disputes are still a first line issue in the rural area including the treated place, as it is revealed in the discussion earlier. Hence, this calls for integrated implementation of the intervention with other programs which would ease tensions of border conflicts. In our models, educations, attending in the awareness creation campaigns are found to significantly reduce conflict. On the other hand, plots that are found at the edges/peripheries are exposed to conflicts even if they are steeply sloped. This demands a continuous follow-ups and effective control of illegal landholding.
3. The intervention has so far limited impact on women's bargaining power within the household through joint titling of the husband and wife. Part of it is due to the demand of long process to change customs and norms male dominance in household decision-making. Therefore, concerted efforts should be made beyond implementing the intervention in increasing their level of awareness and creating favorable conditions to empower them in extra-household activities, as it is difficult to attain intra-household without participating them in different economic, political and social aspects.
4. Intra-household bargaining power is linked with the women's extra-household bargaining power, such as with the community and the State. To capture the multi dimensionality of empowerment, a comprehensive investigation of the other dimensions of empowerment i.e. economic, cultural and political empowerment should be investigated, in order to see the dynamics.
5. Asset at marriage from the side of the female is found to significantly affect women bargaining power. Therefore, the intervention alone cannot result in the intended result in terms of gender equity if it is not backed by some other mechanisms that can increase

their fall-back position through participating them in asset creating activities among others.

6. Those women that are found in a community of believing and perceiving for the equality of husband and wife are tend to perceive and pursue a similar pattern as compared to those living in community that doesn't believe for husband-wife equality, as revealed in our discussion earlier. Hence, when we think of empowering women, a due attention should be given in creating awareness in the community as a whole in line with implementing the intervention under consideration.
7. Further investigations in the area should shed light on women empowerment, may be using more strong data set rather than relying on cross-sectional data, looking on additional variables that are expected to change as time goes with implementation of the interventions. With time, the impact of the intervention on among others; free movement, child education and nutrition, economic and political dimensions should be investigated, which are not the focus of this paper.

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Appendices

Appendix 1. Summary of Descriptive Statistics of Variables Used in the Regressions by Treatment Category

variables	Non Certified		Certified		p-value
	mean	Std dev.	Mean	Std. dev.	
Independent Variables					
Age of household head	46.79	13.1	49.2	14.0	
Sex of household head	.822	.383	.775	.418	
Education of household head	.220	.416	.206	.406	
Number of adults in the household	3.12	1.48	3.14	1.60	
Number of male adults in the household	1.58	.992	1.49	1.12	
Number of female adults in the household	1.55	.917	1.65	1.06	
Number of dependents in the household	2.44	1.62	2.33	1.41	
Family size	5.57	2.34	5.48	2.2	
Dependency ratio	2.22	1.26	2.37	1.41	
Average education of the household	2.48	1.79	2.91	2.14	*
Size of land holding per household	5.50	3.08	5.11	2.55	
Number of parcels	1.72	.650	1.78	.571	
Plot distance from homestead(in kms)	2.07	1.65	1.81	1.33	
Plot age	16.92	7.84	18.33	7.88	
Walka soil type	.711	.454	.646	.480	

Bakel soil type	.085	.281	.077	.268	
Mekayih soil type	.263	.442	.258	.439	
Hutsa soil type	.184	.388	.181	.386	
Slope 1 (flat slope)	.889	.314	.913	.281	
Slope 2 (medium slope)	.061	.241	.0344	.183	
Slope 3 (steep slope)	.134	.342	.129	.336	
Shallow soil depth	.441	.498	.405	.493	
Medium soil depth	.331	.472	.327	.471	
Deep soil	.533	.500	.491	.502	
Tropical livestock unit	4.92	4.70	4.56	11.5	
Tropical livestock unit in 2003 (pre-participation TLU)	6.57	7.4	6.55	13.4	
Average education Squared	9.38	10.8	13.06	11.1	
Community perception about women equity	0.497	1.12	0.569	1.18	
Perceived rich family background of wife	.496	1.12	.568	1.18	
Perceived medium family background of wife	1.00	1.00	.965	1.00	
Perceived poor family background of wife	.331	.47	.327	.47	
Marital status of wife prior to current marriage	.257	.438	.25	.170	
Asset brought at marriage by wife (Valued in oxen)	2.41	4.38	3.54	5.03	**
Demarcation interaction (clear dem=1 and certificate=1	0	0	.99	.09	****
Outcome variables					
Incidence of land border conflict in the last 18 mths	.477	.501	.379	.487	*
Change in border conflict (1=improved 2=no change 3=worsened)	1.42	.674	1.30	.578	
Level of Disputes in the pre 18 mths (1=less 2=no change 3=more)	2.32	.68	2.5	.66	**

Risk of encroachment	.914	.281	.870	.336	
Concern of border disputes to the household	.638	.48	.318	.468	****
Decision on household income	.282	.451	.48	2.88	
Women perception about their equity	0.90	0.29	0.89	0.32	
Decision index	.807	.364	.795	.369	
Self esteem index	.334	.415	.346	.403	
Whether beating of wife is justified	.196	.398	.18	.386	

Appendix 2. Propensity score matching

Algorithm to estimate the propensity score

The treatment is certi_type2

Dummy of			
household			
have PBSLLH			
certificate			
for his plot	Freq.	Percent	Cum.

No certificate	163	58.42	58.42
Certificate	116	41.58	100.00

Total	279	100.00	

Estimation of the propensity score

certi_type2	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
tlu_2003	.0046292	.0132864	0.35	0.728	-.0214117	.0306701
own_land	-.1005146	.0607471	-1.65	0.098	-.2195767	.0185475
educ hh	-.147119	.3362306	-0.44	0.662	-.8061188	.5118808
q1_1_4age02	.0010344	.0124708	0.08	0.934	-.0234078	.0254767
age hh	.0126478	.0134936	0.94	0.349	-.0137991	.0390947
agdif	-.0008047	.0049474	-0.16	0.871	-.0105013	.008892
avgeduc	.1206986	.072781	1.66	0.097	-.0219496	.2633469
plotdist	-.1314276	.0903475	-1.45	0.146	-.3085055	.0456502
plot_age	.019425	.0202697	0.96	0.338	-.0203029	.0591529
bak_type	-.5989905	.5441987	-1.10	0.271	-1.6656	.4676194
walk_type	-.9150301	.4124863	-2.22	0.027	-1.723488	-.1065719
hut_type	-.5582932	.4539608	-1.23	0.219	-1.44804	.3314536
mek_type	-.5601992	.4076205	-1.37	0.169	-1.359121	.2387224
adumale	-.0621136	.1639882	-0.38	0.705	-.3835246	.2592974
adufem	.0460489	.1704818	0.27	0.787	-.2880892	.3801871
famsize	-.0479262	.0860454	-0.56	0.578	-.216572	.1207197
q2_1_parcel	.3178249	.2347399	1.35	0.176	-.1422568	.7779066
_cons	-.1873595	.7214848	-0.26	0.795	-1.601444	1.226725

Note: the common support option has been selected

The region of common support is [.14435687, .75210667]

Description of the estimated propensity score in region of common support

Estimated propensity score			

Percentiles	Smallest		
1%	.168	.1443569	
5%	.243286	.1541803	
10%	.2659095	.168	Obs 275
25%	.3371027	.1702446	Sum of Wgt. 275
50%	.4103328		Mean .4204931
			Largest Std. Dev. .1196192
75%	.4925452	.7141483	
90%	.5814055	.7389909	Variance .0143088
95%	.6407616	.7484196	Skewness .3196318
99%	.7389909	.7521067	Kurtosis 2.780349

Step 1: Identification of the optimal number of blocks

Use option detail if you want more detailed output

The final number of blocks is 4

This number of blocks ensures that the mean propensity score is not different for treated and controls in each block

Step 2: Test of balancing property of the propensity score

Use option detail if you want more detailed output

The balancing property is satisfied

This table shows the inferior bound, the number of treated and the number of controls for each block

	Dummy of household have PBSLLH certificate for his plot		
Inferior of block of pscore	No certif	Certifica	Total
-----+-----+-----			
.144	4	1	5
.2	81	39	120
.4	69	60	129
.6	5	16	21
-----+-----+-----			
Total	159	116	275

Note: the common support option has been selected

End of the algorithm to estimate the pscore

Appendix 3. Survey Instrument

Questionnaire

Assessing “Socio-Economic Impacts of Parcel Based Second Level Landholding Certificates: Evidence From Northern Ethiopia”

Good morning/ afternoon. My name is _____. We are doing a research to develop an academic study about the socio-economic impacts of parcel based second level land holding certificates. I would like to count on your cooperation to understand the socio-economic impacts of the program.

Questionnaire number:

Woreda _____

Tabia _____

Kushet _____

Tibia’s distance from woreda market _____Tibia’s distance from woreda town _____

Tibia’s distance from asphalt road _____Tibia’s distance from gravel road _____

Name of the interviewee: _____

Interviewer _____

Date of interview _____

Checked by _____

Data entry by _____

Household ID code _____

Parcel ID code/code of certificates _____

Respondent gender _____ age _____ education _____ Religion _____

Category I: Household Demographics**A. Provide the details of each household member**

We would like to ask a few questions about all members of the household. Please include everybody who usually lives in the household (including servants etc)

Member ID	1.Name of the household member	2.Relationship to household head Code (a)	3.Sex Male..... 1 Female. ... 0	4.Age	5.Marital status Code (b)	6.Education level Code (d)	7. Main occupation (what is the name of profession or activity? Code (c)	8.Secondary activity (name)	9. How many months did the name live here in the last 12 months
01									
02									
03									
04									
05									
06									
07									
08									
09									
10									

(a)relationship with household 1 Husband/Wife 2 Partner/Cohabite 3 Natural son/daughter 4 Stepson/stepdaughter 5. Son-in-law/daughter-in-law 6 Step-father/mother 7 Half-brother/sister 8 Step-brother/sister	9 Brother/Sister-in-law 10 Grand-parent 11 Cousin 12 Aunt/Uncle 13 Niece/Nephew 14 Other relative 15 Employee 16 Employer 17 Other non-relative	(b)marital stats 1 Single and never married or never in a legally recognized civil partnership 2 Married 3 Widowed 4 Separated but legally married 5 Divorced 6 too young to married	(C) occupation 0 = none 1=farming 2=business 3=laborer 4=unemployed 5=student 6=child 7= other (specify) _____	(d) education 0 too young to attend (child) 1-12 for those who attained formal school 13 college diploma or technical/vocational level 14 first degree and above 15 never attained any formal school but can read and write 16 illiterate(never attend formal school and cannot read and write) 17 other Specify.....
--	---	---	---	--

Category II: Household Asset: land and livestock

Section A: Own Land

A.1 Total area of cultivated land that the household have _____ (tsimdi)

A.2 How many parcels does the household have? _____

1.Plot Name	2.Plot size	3.Distance from home to the plot	4.When did you obtained this plot/age of the plot	5.How did you acquire this plot	6.Do you have the first stage land certificate (belbal) kiti'e	7.Do you have the second stage land certificate	8.If yes, when did you obtained this certificate (2 nd stage)	9.What is the slope of the plot	10.What is the general texture/soil type of the plot	11.What is the general depth of the soil	12.Soil quality (subjective report)
01											
02											
03											
04											
05											
				1=generated local leaders 2=inherited 3=rented 4=farming as tenant	Yes=1 No=0	Yes=1 No=0		Flat=1 Foot hill=2 Mid hill=3 Steep hill=4	1=Ba'ekel 2= Walka 3=Hutsa 4= Mekeyih	1=Shallow, 2=Medium, 3= Deep	1=Fertile 2=Medium 3=Poor

B. Livestock ownership

Can you tell me about your heard of livestock at present?

Type of livestock	1.Number owned and present at home	2.Number owned and present at home in summer 2011(kremti 2003)	3.Did you buy any ...(...) during the last 18 months			4.Did you sell any ...(...) during the last 18 months			5.During the last six months how many were born?
			a.Number bought	b.Total purchased vale of all bought	c.Financing of the purchase (code a)	a.Number of sold (if none write 0)	b.Total sales values of all sold	c.Reasons for sold (code b)	
Young bulls/oxen									
Cows									
Heifer / Calves									
sheep									
Goats									
Horses/ Mules									
Camels									
Donkey									
Beehives									
poultry									

(a)Financing purpose

Income from farm1
 Other income2
 Income from sale of livestock3
 Income from sale of asset4
 Saving5
 Loan/gift from relative6
 Other specify.....6

(b)Reasons for sale

To help relatives1
 To buy food.....2
 To buy other goods3
 To buy seeds4
 To buy livestock5
 To pay for labor6

To repay loans7
 To pay tax8
 To buy building material.....9
 To pay for health expense10
 To pay for education expense11
 Other12
 Specify.....

C. Livestock yield

Livestock product	1.How much of the livestock product have you produced since the last four months (write “0” if product was not produced)	2. How much of this product did the household use for consumption since the last four month?	3. How much of this product did the household sell since the last four months?	4. How much of this product did the household give to other HHs the last four months?	5. How much of this product did the household currently have in storage?
Milk (L)					
Butter(kg)					
Eggs (#)					
Hides/skins(#)					
Honey(kg)					
Other					

Category III: Land registration and certification process.

A. Participation in the program and awareness creation.

1. Were public information meetings held before the land registration program started? 1 yes, 0= no **(if no go to Q-4)**
2. Did you or a member of your family attend any of these meeting? 1=Yes, 0=No **(if no go to Q-4)**
3. How many of these meeting did you or a member of your family attended?
4. How do you evaluate the efforts made by government (woreda or regional level) to make you aware about the second stage land certification? 1= Good enough 2= Not enough at all 3= Difficult to explain 4= No response
5. Is any one of your family or you member of the land administration committee? 1=Yes, 0=No

Category IV: Issues Related to Tenure Security and Land Related Disputes

1. Who will inherit this plot from you?

1=Oldest son/daughter, 2=Oldest son, 3=Oldest daughter, 4=Youngest unmarried son/daughter, 5=Unmarried son, 6=Unmarried daughter, 7=Favorite son, 8=Favorite daughter, 9=other family members, 10=the village, 11=don't know, 12=other specify

2. Who can grab the land away from you?

1 =Village Chief 2= Brother/in law /Sister/ in law 3=None 4=Owner
5= government 6.....Other (specify).....

3. What measures do you take to ensure (that) NOT lose the plot?

1=Plant tree 2=fallow 3= leave for grazing
4=registered 5=none 6=other (specify).....

4. Did you have the parcel based second level landholding certificate for your plot?

1=Yes 0=No (**Go to Q-6**)

5. If YES, in whose name was it?

1= head 2=joint (husband and wife) 3=both son and daughter
4= joint plus list of family members 5=other (specify).....

6. **If No**, why not? 1=Land registration was not held in our district

2=I did not want the certificate, 3=I refused to get for the certificate, (go to Q-10)
4=I have not yet been given the certificate I should have,
5= Did not submit photos yet, 6=Difficult to get photos, 7=Expensive,
8=Other, specify _____

7. If you refused to receive or NOT volunteer to get the certificate, what were the reasons?

1=Certificate is only a piece of paper and has no value 2=Certificate does not provide tenure security
3=Certificate may cause me to have to pay more tax,
4=other, specify:

8. If you don't have a certificate, would you prefer to receive a new land certificate with a map of each of your plots, with clear identification of the location and size and shape of the plot? 1=Yes, 0=No

9. **If yes**, how much would you maximum be willing to pay for it or how many man days are you maximum willingness to work for the kebele to obtain such certificate?

10. Have you had any border conflicts on the plot? In the last 18 months? 1= Yes 0= No

11. What type of conflict is common in your vicinity?

1= Border disputes 2=Plot ownership 3= Inheritance dispute
4=Divorce disputes 5=Other, specify.....

12. Where was this conflicts resolved?

1=LAC 2=Village chief 3=Byto (tabia Court)
4=DA 5=wereda court 6= Negotiation by old villagers

13. Are the borders of your plots clearly demarcated? 1=yes, 0=no

14. Is there any change in border disputes related to your land in the last 18 months?
1= less disputes 2= no difference, 3= more disputes
15. Do you think that the second level land registration had any effect on reduction of border disputes related? 1= yes it have 2= I don't think so 3 =Never
16. **Only for Certified Respondents**, How was land border conflict **during** the implementation of the program? 1= less disputes 2= no difference, 3= more disputes
17. Does having a certificate protect you against encroachment on your land by neighbors?
1=Less risk of encroachment, 0=No difference
18. How do you evaluate the level of land dispute in the last 18 months in your community?
1= worsened/ increase, 2= no change, 3= improve
19. Are border disputes a great concern for you? 1= Yes, 0=No
20. In your opinion what type of measures should be taken to mitigate land dispute?

_____.
21. Has the land registration and certification had any effect on the amount of inheritance disputes in your community?
1=More inheritance disputes 2=No change 3=Less inheritance disputes
22. Do you think that you will cultivate the same field after five year?
1= yes/ certain/ sure 0= I do not think so (not)
23. Do you think there will be any new land redistributions in your kebele within the next five years? 1=Yes, 0=No
24. Do you fear that your land is taken by the government at any time?
1= Yes, I fear 2. No I don't fear 3= no response
25. Is there any improvement of tenure security enhancing measure taken place within the last 2 years about ownership of the land?
1=improve 0= no change -1= worsen or reduce.
26. Do you believe that your holding right is secured as result of certificate of holding?
1=Yes, 1=No, 3= No response
27. How likely you can counterclaim for ownership of the plot?
1=Impossible 2= unlikely 3= likely 4= no change
28. Do you feel that having a certificate will increase the possibility of obtaining compensation in case the land is taken? 1=Yes, 0=No, 2=Not sure
29. Do you believe that having a land certificate improves the tenure security of women?
1=Yes, 0=No, 2=Not sure
30. Do you believe that having land certificate will reduce the number of conflicts related to inheriting land to children? 1=Yes, 0=No, 2=Not sure
31. If your land were suddenly demanded for public purposes by the tabia, how much compensation, minimum, would you consider being a fair compensation for losing your land? _____birr

32. If it became legal to sell land, would you consider sell the land if you got a good price?
1=Yes, 0=No, 2=Only if I came in a desperate situation,
33. If you were allowed to sell your land and are willing to sell it, how much would be the minimum acceptable price for you to sell it now? Price without value of your house and other buildings on your land (cultivated land only). _____birr
34. Does having a certificate make you more willing to rent out the land to strangers?
1=Yes, 0=No
35. Do you think that having land certificate make land market easy and secure? 1=Yes, 0=No
36. What type of tenure arrangement do you prefer?
1=Privet Ownership 2=State Ownership 3= No Idea

Category V: Gender Issues

1. Have you been married before? 1= Yes, 0= No (Go to Q-4)
2. If yes, what was the reason for the break? 1= divorce, 2= death of partner.
3. If yes, how much land do you get after divorced? _____ tsimdi
4. Do you have TDAR today? 1= Yes, 0= No
5. In case of divorce today, how much of the land you and your wife/husband would get?
_____ 1= Equally shared with my spouse 2= Less than half appropriated to husband
3= less than half appropriated to wife 4= I don't know
6. In case of divorced, what would females do with their land in your community? 1= share crop it 2= crop it themselves(with help of son) 3= rent it out for money, 4= other
7. In case of the divorced, how many of the children are expected to stay with you? 1= all
2=none of them 3= some of them (**age and sex those with wife, indicate it in table A**)
4=do not have children 5= don't know
8. Do you think that your wife or you (if the respondent is wife) have strong land right after the new land certification? 1= Yes, No = 0
9. Is there any change in relation to ownership of plot? 1= Yes, No = 0
10. Do you agree with the following rules?
 - i. Joint title of husband and wife? 1= Yes, 0= No
 - ii. Equal sharing of land upon divorce? 1= Yes, 0= No
 - iii. Only wife's name on certificate, if second and third wife of polygamous men? 1= Yes, 0= No
 - iv. Females should be allowed to plough the land? 1= Yes, 0= No
11. How do you perceive the regulation that the wife also should have her name and picture on the certificate? 1=Indifferent (acceptable), 2=Good, 3=Bad

12. Does the wife's name on the certificate, affect her power over the land?
 1=Has no effect, 2=She has a stronger position in case of divorce or husband's death,
 3=She involves more in land-related decisions within marriage (e.g. crop choice and
 input use), 4=She controls more of the income from production on the land,
 5=She is involved in land-renting decisions, 6=She does more work on the land,
 7=other, specify_____
13. Does it matter how much land you brought into marriage, for how much you get in case
 of divorce? 1=It does not matter, equal share always, 2=Only land obtained during
 marriage is shared equally, 3=Inherited land is kept by the individual, other land is shared
 equally, 4=You can keep land that has been allocated to you as an individual, 5=Other,
 specify
14. Do your wife (you) get remittance from relatives that is earned in the last four months?
 1= Yes, (by whom? a=husband side b= wife c= both) 0=No (**Go to Q-16**)
15. How much did you get remittance in the last four months? _____
16. Can family members deny the (male) head of household to rent out their family land?
 1=Yes, if they want to, 2=Yes, but only the wife, 3=No
17. Is there a Land Administration Committee in your Tabia? 1.Yes, 2=No, 3=Don't know
18. If yes to Q#17, did you participate in the election of the committee? 1=Yes, 0=No
19. If yes to Q#17, is there a reservation for female members in the land administration
 committee? 1=Yes, 0=No, 2=Don't know
20. If yes to Q#19, what is the minimum number of female members that has to be placed in
 the land administration committee? _____
21. If yes to Q#19, are there female members in the current land committee of the Tabia?
 1=Yes, 0=No, 2=Don't know
22. If yes to Q#19, are you a member of the land administration Committee? 1=Yes, 0=No
23. Put the options below on who decides the following issues.

1=husband 2=husband and wife 3=wife 4= other_____

23.1 Daily household need	
23.2 Large household purchase	
23.3 Land rent out/share cropping if needed	
23.4 Adoptions of modern input/fertilizer	
23.5 Improved seed adoption	
23.6 Left fellow	
23.7 Type of crop/seed selection	
23.8 Decisions on credit	

24. Perceived Family Background of wife (relative):_____ 1=poor 2=medium 3=rich
25. Put your level of agreement on: 'a husband is justified in beating his wife for each of the
 following reasons': 0=no 1=yes
- if she burns the food;_____
 - if she argues with him;_____
 - if she goes out of the house without telling him; _____
 - if she neglects the children_____

26. Is there credit access reserved for women in your tabia? _____ 0=no 1=yes
27. Had the wife borrowed money from any institution in the last 2 years? ___ 0=no 1=yes
28. What was the amount of asset brought to marriage by the side of the wife? _____ birr,
_____ in kind.
29. Who controls majority of the income of the household? 1=husband 2=wife 3=equal 4=other _
30. Who decides on the income of the household? 1=husband 2=wife 3=equal 4=other specify__
31. Do you believe that you are equal with your spouse? 0=no 1=yes
32. Do the community perceive equality of men and women? 0=no 1=yes
33. Do women themselves perceive that they are equal with men? 0=no 1=yes
34. Why _____

Category VI: Investment on plot

- 1) Are you interested in planting trees on any of your plots? 1= Yes, 0 =No
- 2) Did you plant tree in your plot in the last 18 months? 1= Yes, 0 =No
- 3) Does having the land certificate increase your incentive to plant tree? 1= Yes, 0 =No
- 4) Do you think that tree planting enhance tenure security/reduce the probability of losing land?
1= Yes, 0 =No
- 5) Are you interested in adoption of SWC bound in your plot? 1= Yes, 0 =No
- 6) Did you made any SWC bound in the last 18 months? 1= Yes, 0 =No
- 7) Are you interested in adoption of STC in your plot? 1=Yes, 0=No
- 8) Did you made any STC in any of your parcel in the last 18 months? 1=Yes, 0=No
- 9) Is there any SWC bound or STC made before 18 months in your plot? 1= Yes, 0 =No
- 10) Did you made improvements on your farm land for the existing SWC or STC to improve in
the last 18 months? improve =1, no change =0, worsened/reduce = -1
- 11) Do you think that investment on plot (SWC and STC) enhance/improve productivity? 1=
Yes, 0 =No
- 12) Is there any public investment of SWC bound or ST construction made in any one of your
parcel/plot in the past 18 months?
1= Yes, 0 =No (Go to the table)
- 13) If **yes** please estimate the approximate total meters (how many in meters) of those
investments in your own entire plot? _____
- 14) Is there any pressure from community to invest on your plot any type of investment? 1=
Yes, 0 =No
- 15) Reasons for investment on land (**possible to answer more than one**)

Improve soil quality = 1	Incentives given = 2
Advice from extension workers = 3	Perceives Increase yield (productivity) = 4
Perceives Control soil erosion = 5	Perceives Reduce probability of losing land = 6
Pressure from community = 7	Other (Specify) _____

16.

Plot name/ID	1.Number of natural tree in plot(write 0 if none)	2.Number of young tree planted before 18 months in plot	3. If Q-1 is yes, Did you plant tree in your plot in the past 18 months	4. How many trees are there? Number	5. Length of SWC bound constructed before 18 months in your plot(write 0 if none)	6. Did you made any SWC bound in the last 18 months	7. How much (Intensity) in meter	8. Length of ST constructed before 18 months in your plot (write 0, if none)	9. Did you invest any STC in the last 18 months	10. How much (meters)
01										
02										
03										
04										
05										
06										
			1= yes 0=no			1= yes 0=no			1= yes 0=no	

Category VII: Input use

The input questions refer to all crops as a whole.

7.1 Total area of land cultivated during the last summer (2012)_____ (in tsimdi)

7.2 Total area of land cultivated during the last summer (2012) on which fertilizer was used_____ (in tsimdi)

7.3 Total area of land covered by improved seed during the last summer (2012)_____ (in tsimdi)

	1.Did you use any manure from your household herd on your fields? Yes = 1 No = 0	2.Did you purchase any fertilizer for use on your fields?				3.Did you purchase any improved seed for use on your fields?				4.Number of household visits and community meetings called by DA attained by the household members in the last 6 months.	5.Did you apply and get lone in the past 12 months Yes = 1(amount pls?) No = 0	6.Did you belongs to a farming organizations(cooperative) Yes = 1 No = 0	7.Participates in off-farm income in the last 18 months	8.Receipt national or international remittance in the last 18 months
		a.Yes =1 N = 0	b.Amount	c.Unit	d.Total value	a.Yes=1 No = 0	b.Amount	c.Unit	d.Total value					
7.4 Total														

7.5 Did you participate in food/cash for work activities in the last 18 months?

Yes ☐

No ☐

The questions refer to all the land on which crops were harvested during the last season.

Activity	1.Ploughing	2.Weeding	3.Harvesting
7.6 How many days did you do this activity (labor cost)			
7.7 Oxen days			

7.8 Do you have irrigable land? 0=no 1=yes

7.9 If your answer for the above question is yes, how much? _____ tsimdi

Category VIII: Crop output and sales market

For each crop harvested during the last season (kiremt 2004 E.C) can you answer the following questions?

8.1 For permanent crops, mention the harvest during the period since the beginning of September 2004 E.C

Plot name	1.Crop code(a)	2.How much was you Harvest during the last (kiremt)		3. Have you sold any part of this harvest? Yes.....1 No0,next crop	4.If you sale any part of your harvest, answer questions on amount and revenue		
		a.Quantity	b.Unit(b)		a.Amount	b.Unit (b)	c.Total revenue (Birr)
01							
02							
03							
04							
05							
06							

(a) Crop code

White teff	1
Black and mixed teff	2
Barley	3
Wheat	4
Karka'Eta	5
Maize	6
Sorghum	7
Oats	8
Beans	9
Linseed	10
Groundnuts	11
Sesame	12
Pulses	13

Lentils	14
Vegetables (kosta, selata).....	15
Chat	16
Banana, papaya, orange	17
Grass	18
Geshu	19
Eucalyptus	20
Potatoes	21
Onion	22
Tomato	23

Guava (zeytuna).....	24
Sugarcane.....	25
Zengada (lequa)	26
Other	27
Specify.....	

b)Quantity unit		Silicha	7	Kubaya	13
Kilogram	1	Chiret/adaberia	8	Birchiko	14
Quintal	2	Litters	9	Gembo	15
Aybet	3	Ensira	10	Birr	16
Loketa	4	Minelik	11	Others	17
Kafer	5	Shember	12	Specify	
Mishe	6				

8.2 How do you evaluate the productivity of your farm lands in last two years?

1= decrease 2=the same as before 3=shows increasing trend 4= difficult to explain

8.3 Reasons for the above _____

8.4 What other factors influence the productivity of your farm?

CHECK LIST QUESTIONS

- 1) Is your cadastral system based on deeds registration or on title registration?

1= Deeds registration

2= Title registration

3= Other.....

4= Specify_____

- 2) By law, is registration of land ownership compulsory or optional?

1=Compulsory

2= Optional

3=Others.....

- 3) If felt necessary, please, comment on the actual practice and the legal consequences.

Approach for the establishments of the cadastral records

- 4) Are landowners required to register their properties systematically during the initial establishment of the cadastre or is registration sporadic, i.e. triggered only by specific actions (such as for example sale)?

1=Systematic (regular)

2= Sporadic (irregular)

3= Both

4=All properties are already registered

5=Other.....

- 5) What is the population of the wereda(one of the wereda) _____

- 6) Please estimate the approximate total number of smallest uniquely identified land units, often called "land parcels" in your wereda/ tabia(depending on the respondent)

- 7) What the approximate total number is of registered in terms of house hold?

- 8) Please estimate the distribution between the smallest uniquely identified land units, often called, "land parcels"

(i) That are legally registered and surveyed, -----

ii) That are legally occupied but not registered or surveyed, -----

(iii) That is informally occupied without any legal title -----

- 9) Total number of professional land surveyors, such as licensed surveyors active within the cadastre system? _____
- 10) Proportion of the time that these land surveyors commit for cadastral matters:_____
- 11)Total number of lawyers/solicitors or equivalent active within the cadastral system:_____
- 12) Proportion of the time that these land surveyors commit for cadastral matters:_____
- 13) Whose name would it be written in the second level land holding certificates name list as owner?
1= head 2=joint (husband and wife) 3=both son and daughter
4= joint plus list of family members 5=other (specify).....
- 14) What type of communication means do you use to disseminate information? 1= radio 2=TV 3=news paper 4= conferences (#) if any please _____ 5= other (specify)
- 15) Is there a statutory system of land registration which records rights in land, including ownership, in a public register?
- 16) If there is, please list the main laws which govern land registration?
- 17) Who is authorized to independently supervise or audit the operation of the Land Registration?
- 18) Does the head of the Registration office have statutory powers to decide, from evidence and documentation provided, questions of land ownership, and the benefit and the burden of other rights affecting land - or is the Registry simply a place of record of legal facts and documents ? (please specify)
- 19) Does the act of registration confer legal status on the rights in land? (The legal status is determined by lawyers who investigate and provide an opinion on the quality of the title)
- 20) Are the Land Rights that are registered guaranteed by the State or by any other means (please specify)?
- 21) Can an approved enquirer obtain a copy of any register or map of a registered property?
- 22) Is registered land related to a map indicating the extent and the boundaries of the property?
- 23) Are boundaries determined precisely by co-ordinates or are they determined by general Boundaries in relation to a topographic map? Specify or choice one of the following way; 1. By co-ordinates in the digital cadastral map,

2. By measured data in field sketches, or

3. By representation in graphical map only.

- 24) Which organization is responsible for maintaining the survey and mapping of registered properties?
Specify it at wereda, regional and national level please?
- 25) Does the law or any regulation require that unique reference numbers are used for registered land?
(Please specify).
- 26) To what extent is the cost of maintaining the land registration system financed by fees paid by customers or by the regional and federal government funding (indicate relative percentage)?
Government funding%, Fees paid by customers%, other means% (please specify).
- 27) Are fees set under the provisions of the law or regulations, (please indicate any legal provision that governs the setting of fees)?
- 28) Does the law specify any formal relationship or co-ordination between the organizations responsible for registering land rights, cadastral survey and mapping, land valuation and land use?
(Please describe and how is responsible for each task)
- 29) Is it possible to obtain the welfare classification list of household in each tabia? (classification shows livelihood poor, middle and relatively richer households)
- 30) Number of land distribution taken please after 1991? -----
- 31) Population density of each tabia?
- 32) Number of households live in each tabia?
- 33) Number of households who haven't land in each tabia?
- 34) Latitude of each tabia/wereda?
- 35) Average rainfall in each tabia/woreda?
- 36) Level of productivity of each tabia?

Appedix 4: Among the peculiarities of the program: computerized system and joint titling.



Appendix: A Glimpse at the Data Collection and Fieldworks